**Charts & Averages – Exercise 1 – Pie Charts**

|  |  |  |  |
| --- | --- | --- | --- |
| **Favourite Colour** | **Frequency** | **Fraction** | **Angle** |
| Red |  |  |  |
| Blue |  |  |  |
| Green |  |  |  |
| Orange |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Holiday Destination** | **Frequency** | **Fraction** | **Angle** |
| Europe |  |  |  |
| Asia |  |  |  |
| Africa |  |  |  |
| Antarctica |  |  |  |

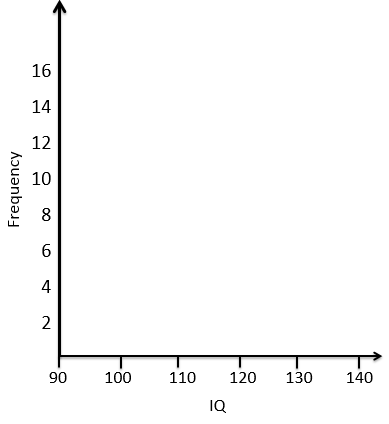
|  |  |  |  |
| --- | --- | --- | --- |
| **Games Console Owned** | **Frequency** | **Fraction** | **Angle** |
| Wii U |  |  |  |
| PS3 |  |  |  |
| Xbox 360 |  |  |  |
| None |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Age of mother** | **Frequency** | **Fraction** | **Angle** |
| 16-30 |  |  |  |
| 30-35 |  |  |  |
| 35-40 |  |  |  |
| 40+ |  |  |  |

**Charts & Averages - Exercise 2 - Frequency Diagrams**

Example:

|  |  |
| --- | --- |
| IQ () | Frequency |
|  | 2 |
|  | 15 |
|  | 8 |
|  | 0 |
|  | 4 |

****

**Q1.** The frequency table gives information about the times it took some office workers to get to the office one day.

|  |  |
| --- | --- |
| **Time (*t* minutes)** | **Frequency** |
| 0 < *t* ≤10 | 4 |
| 10 < *t* ≤ 20 | 8 |
| 20 < *t* ≤ 30 | 14 |
| 30 < *t* ≤40 | 16 |
| 40 < *t* ≤50 | 6 |
| 50 < *t* ≤60 | 2 |

(a) Draw a frequency polygon for this information.



**Q2.** 30 students took a test.

The table shows information about how long it took them to complete the test.

|  |  |
| --- | --- |
| **Time (*t* minutes)** | **Frequency** |
| 0 < *t* ≤ 10 | 5 |
| 10 < *t* ≤ 20 | 7 |
| 20 < *t* ≤ 30 | 8 |
| 30 < *t* ≤ 40 | 6 |
| 40 < *t* ≤ 50 | 4 |

(a) On the grid, draw a frequency polygon for this information.



3. Pick the most suitable chart to display the data described. (Put ✓ as appropriate)

|  |  |  |  |
| --- | --- | --- | --- |
| **Data** | **Pie Chart?** | **Bar chart?** | **Histogram/**  **Frequency Polygon** |
| I’m taking a survey to establish people’s favourite brand of bread. I give a number of shoppers a taste of each and then record their favourite. |  |  |  |
| I record the weights of dogs in Battersea Dogs Home and then group these into intervals of 5kg (e.g. ). |  |  |  |
| I want to show votes for 5 different candidates for 7AJW Form Captain. |  |  |  |
| I record the shoe size of 100 children. I group them into intervals, e.g. 1 ½ -3, 3 ½ -5, 5 ½ -7, … |  |  |  |
| I survey 500 university students who have just graduated to see what type of career they’ve gone into (Education, Finance, …) |  |  |  |
| I record the heights of 1000 trees and group them into intervals of 10m (, …) |  |  |  |

4. a) Draw a bar chart for this frequency table using the axis provided. Ensure you label your axes.

|  |  |
| --- | --- |
| Age | Freq |
| 11-15 | 3 |
| 16-20 | 6 |
| 21-25 | 2 |
| 26-30 | 7 |

b) Why technically are we using a bar chart and not a histogram?

**Charts & Averages - Exercise 3 – Averages & Range**

1. For the following lists of numbers, determine the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mode | Median | Mean | Range |
| 1, 2, 3, 4, 5 |  |  |  |  |
| 1, 3, 3, 6, 10, 13 |  |  |  |  |
| -4, -2, 6, 6 |  |  |  |  |
| 0, |  |  |  |  |
| -1.8, 0, 2.7, 4.9, 4.9, 14.9 |  |  |  |  |

1. Determine the numbers given the clues.
   1. Two numbers have a mean of 9 and a range of 6.
   2. The mode of four numbers is 6, the median is 8, and the mean is 9.
   3. The median of four numbers is 6, the range is 5 and the mode is 4.
2. [JMC 2013 Q2] Heidi is 2.1m tall, while Lola is only 1.4m tall. What is their average height?
3. [JMC 2007 Q12] The six-member squad for the Ladybirds five-a-side team consists of a 2-spot ladybird, a 10-spot, a 14-spot, an 18-spot, a 24-spot and a pine ladybird (on the bench). The average number of spots for members of the squad is 12. How many spots has the pine ladybird?
4. [JMC 2011 Q13] What is the mean of and ?
5. [JMC 2003 Q19] When the diagram below is complete, the number in the middle of each group of 3 adjoining cells is the mean of its two neighbours. What number goes in the right-hand end cell?  
   
6. [Kangaroo Grey 2013 Q4] There are five families living in my road. Which of the following could not be the mean number of children per family that live there?  
   A 0.2 B 1.2 C 2.2  
   D 2.4 E 2.5
7. [IMC 2004 Q10] What is the mean of and ?
8. [JMC 2007 Q20] At halftime, Boarwarts Academy had scored all of the points so far in their annual match against Range Hill School. In the second half, each side scored three points. At the end of the match, Boardwarts Academy had scored 90% of the points. What fraction of the points in the match was scored in the second half?
9. [Kangaroo Grey 2011 Q12] A teacher has a list of marks: 17, 13, 5, 10, 14, 9, 12, 16. Which two marks can be removed without changing the mean?   
   A 12 and 17 B 5 and 17 C 9 and 16 D 10 and 12 E 10 and 14
10. The sum of five consecutive integers is equal to 140. What is the smallest of the five integers?
11. [IMC 2015 Q11] Three different positive integers have a mean of 7. What is the largest positive integer that could be one of them?
12. [IMC 2006 Q15] What is the mean of and ?  
    A B 1.666 C 1.665   
    D E 1.65
13. [SMC 2001 Q6] The mean of seven consecutive odd numbers is 21. What is the sum of the first, third, fifth and seventh of these numbers?

* [JMO Mentoring Feb2012 Q5] On the second to last test of the school year, Barbara scored 98 and her average score so far then increased by 1. On the last test she scored 70 at which her average score then decreased by 2. How many tests has she taken through the school year?
* [Cayley 2007 Q6] You are told that one of the integers in a list of distinct positive integers is 97 and that their average value is 47.   
  (a) If the sum of all the integers in the list is 329, what is the largest possible value for a number in the list?  
  (b) Suppose the sum of all the numbers in the list can take any value. What would the largest possible number in the list be then?

**Charts & Averages - Exercise 4 – Stem & Leaf Diagrams**

**1.** Here are the times, in minutes, taken to solve a puzzle.

5 10 15 12 8 7 20 35 24 15

20 33 15 24 10 8 10 20 16 10

(a) In the space below, draw a stem and leaf diagram to show these times.

(b) Find the median time to solve this puzzle.

………………………. Mins

**2.** The stem and leaf diagram gives information about the numbers of tomatoes on 31 tomato plants.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 8 | 8 | 9 |  |  |  |  |  |  |
| 1 | 1 | 1 | 5 | 5 |  |  |  |  |  |
| 2 | 1 | 2 | 2 | 6 | 7 | 8 | 8 |  | Key: 5 | 7 = 57 tomatoes |
| 3 | 0 | 2 | 5 | 5 | 7 | 9 |  |  |
| 4 | 2 | 2 | 3 | 5 | 8 | 8 |  |  |  |
| 5 | 1 | 1 | 3 | 4 | 7 |  |  |  |  |

Work out the median.

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**3. [Q1, March 2013 2H]** Here are the ages, in years, of 15 students.

19 18 20 25 37

33 21 17 29 20

42 18 23 37 22

Show this information in an ordered stem and leaf diagram.



**4**. Here is the weight of 16 cats:

4.5kg 4.9kg 5.2kg 3.9kg 4.1kg  
 5.0kg 3.6kg 4.9kg 5.3kg 4.3kg  
 7.4kg 3.6kg 5.3kg 3.8kg 5.3kg

(a) Produce an ordered stem and leaf diagram to show this information.  
  
  
  
  
  
  
  
  
  
  
 (b) What is the median weight?  
  
 (c) What is the mode weight?

**Charts & Averages - Exercise 5 – Mean of Frequency Tables**

1. At a party, thirty people have an age of 30, forty have an age of 40 and fifty an age of fifty. What is their average age?
2. In a hardware shop, there are 30 spanners costing £6, 55 hacksaws costings £9 and 10 soldering irons costings £20. What is the average cost per item?
3. Using this frequency table, find the average height of a turnip.

|  |  |
| --- | --- |
| Height (nearest cm) | Freq |
| 6 | 3 |
| 7 | 8 |
| 8 | 12 |
| 9 | 4 |
| 10 | 1 |

1. Sam collects the weights of 15 squirrels and puts them into weight ranges. His data is presented below. Estimate the mean weight of a squirrel.

|  |  |
| --- | --- |
| Weight () in kg | Freq |
|  | 7 |
|  | 3 |
|  | 4 |
|  | 1 |

1. Miss Clarke values a number of pieces of artwork in the Tiffin School Vault. The price ranges are summarised below. Estimate the average value of a piece of art in school.

|  |  |
| --- | --- |
| Value () in £ | Freq |
|  | 10 |
|  | 25 |
|  | 6 |
|  | 1 |

1. I record the times of 50 runners in a 10km race. Their times are summarised below. Determine their mean time in minutes.

|  |  |
| --- | --- |
| Time (mins) | Freq |
| 35-40 | 5 |
| 40-42 | 15 |
| 42-48 | 20 |
| 48-60 | 10 |

1. The 180 students of Year 7 have an average IQ of 124 and the 150 students of Year 8 have an average IQ of 95. What’s the average IQ of all the students?
2. 10 friends have an average of 5 dogs each. When 5 friends joined them the average number of dogs dropped to 4.6. What was the average number of dogs these extra five men had?
3. If I mix 2kg of substance A which contains 8% poison with 8kg of substance B which contains 2% poison, what percentage poison is the mixture?