**Skill Sheet: Plotting and Interpreting Graphs**

***What You Need to Know:***

Engineers use graphs to present data in a visual form:

***Examiners***

***Top Tip***

*Line graphs can be more effective to show small changes over time than bar graphs*

* Line graphs and area graphs are used to track changes over time or to identify the relationship between two or more groups of values.
* Bar graphs are used to compare things between different groups, or to show the frequency at which something occurs.
* Pie charts are used to compare the parts of a whole, such as the different categories that make up a total.

You may be asked to read data from graphs, explain the meaning of data shown in graph form or to plot graphs from provided data.

***Example:***

The pie chart in Figure 1 shows the proportion by cost of different types of materials and parts used by a company.

**Figure 1**

The total expenditure by the company was £12 million.

1. Calculate the value of the metals segment.
2. Calculate the fraction of the total expenditure that is for timbers. Give your answer as a fraction in its lowest form.

***Answer:***

1. 0.32 x 12000000 = £3840000
2. 15 / 100 = 3 / 20

***Now Try These:***

1. 40 customers completed a questionnaire giving a preference for the colour of a product.

The results were: green 5; blue 9; red 11; black 7; no preference 8.

On the graph paper below, produce a bar chart showing these results.

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**Practice Sheet: Plotting and Interpreting Graphs**

***Now Try These:***

1. An engineering company collected data on the lifespan of their products, table 1. Data was recorded for 50 products. All of the products failed in less than 100 hours.

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| Hours to failure | 0 < 20 | 20 < 40 | 40 < 60 | 60 < 80 | 80 < 100 |
| Total number of failed products | 3 | 9 | 17 | 29 | 50 |

**Table 1**

1. Produce a graph of the cumulative number of failures against the time to failure



1. Calculate the mean average number of hours until the product fails

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1. Determine the time at which 50% of the products failed.

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1. Explain the difference between the values calculated in b and c.

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**Answers:**

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1. 

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1. a)

b) Average value = ((3x10)+(6x30)+(8x50)+(12x70)+(21X90))/50 = 66.8 hours

c) 50% failure equates to 25 (out of the 50) components.

From the graph, this equates to approximately 72 hours.

 d) The relationship is not linear/ is exponential