Estimated Means

Study Development Worksheet

Questions

1. A café owner thinks that she sells more cupcakes now that she has swapped to a different kind of decorations. In July, when she was using the old decorations, she sold a mean average of 6 cupcakes per day. She records the number of cupcakes she sells per day for August, when she is using the new decorations. Did she sell more cupcakes on average with the new decorations?

|  |  |
| --- | --- |
| **Number of cupcakes sold in a day in August** | **Frequency** |
| 1-3 | 3 |
| 4-6 | 9 |
| 7-9 | 12 |
| 10-12 | 6 |
| 13-15 | 1 |

1. A YouTuber wants to know if they get more views on their videos about fashion or more on their videos about cooking. They produce this table about the number of views on their fashion videos:

|  |  |
| --- | --- |
| **Number of views,** $x$ | **Frequency** |
| 0 $\leq x <$ 50,000 | 5 |
| 50,000 $\leq x<$ 100,000  | 7 |
| 100,000 $\leq x <$ 150,000 | 13 |
| 150,000 $\leq x <$ 200,000 | 1 |
| 200,000 $\leq x <$ 300,000 | 3 |

They have 16 videos about cooking, which have a total of 1,625,301 views.

Which type of video gets a higher average number of views?

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1. Some data is recorded about some participants in a medical study. What is the average age of the participants?

|  |  |  |  |
| --- | --- | --- | --- |
| **Age range (years)** | **Gender** | **Height (cm)** | **Eye colour** |
| 32-38 | Female | 170 | Blue |
| 18-24 | Female | 163 | Brown |
| 18-24 | Male | 155 | Brown |
| 39-45 | Prefer not to say | 171 | Hazel |
| 25-31 | Other | 168 | Green |
| 46-52 | Female | 180 | Blue  |
| 67-73 | Female | 150 | Blue |
| 25-31 | Male | 165 | Brown |
| 53-59 | Other | 172 | Blue |
| 25-31 | Male | 173 | Brown |

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Answers

1. Firstly, we add a midpoint column to the table:

|  |  |  |
| --- | --- | --- |
| **Number of cupcakes sold in a day in August** | **Frequency** | **Midpoint** |
| 1-3 | 3 | 2 |
| 4-6 | 9 | 5 |
| 7-9 | 12 | 8 |
| 10-12 | 6 | 11 |
| 13-15 | 1 | 14 |

Then, we add a midpoint multiplied by frequency column:

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of cupcakes sold in a day in August** | **Frequency** | **Midpoint** | **Midpoint x frequency** |
| 1-3 | 3 | 2 | 6 |
| 4-6 | 9 | 5 | 45 |
| 7-9 | 12 | 8 | 96 |
| 10-12 | 6 | 11 | 66 |
| 13-15 | 1 | 14 | 14 |

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We then find the sum of the frequency column, and the sum of the midpoint times frequency column:

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of cupcakes sold in a day in August** | **Frequency** | **Midpoint** | **Midpoint x frequency** |
| 1-3 | 3 | 2 | 6 |
| 4-6 | 9 | 5 | 45 |
| 7-9 | 12 | 8 | 96 |
| 10-12 | 6 | 11 | 66 |
| 13-15 | 1 | 14 | 14 |
|  | 31 |  | 227 |

We then calculate the mean:

227 ÷ 31 = 7.32

So, she has sold more cupcakes on average per day in August than in July.

**Note:** This does not tell us if her new decorations are responsible for the increase in sales, just that there was an increase.

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1. To find the estimated mean of the fashion video views, first we add the midpoint column:

|  |  |  |
| --- | --- | --- |
| **Number of views,** $x$ | **Frequency** | **Midpoint** |
| 0 $\leq x <$ 50,000 | 5 | 25,000 |
| 50,000 $\leq x<$ 100,000  | 7 | 75,000 |
| 100,000 $\leq x <$ 150,000 | 13 | 125,000 |
| 150,000 $\leq x <$ 200,000 | 1 | 175,000 |
| 200,000 $\leq x <$ 300,000 | 3 | 250,000 |

We then add another column to show the midpoint multiplied by the frequency:

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of views,** $x$ | **Frequency** | **Midpoint** | **Midpoint x frequency** |
| 0 $\leq x <$ 50,000 | 5 | 25,000 | 125,000 |
| 50,000 $\leq x<$ 100,000  | 7 | 75,000 | 525,000 |
| 100,000 $\leq x <$ 150,000 | 13 | 125,000 | 1,625,000 |
| 150,000 $\leq x <$ 200,000 | 1 | 175,000 | 175,000 |
| 200,000 $\leq x <$ 300,000 | 3 | 250,000 | 750,000 |

Estimated Means

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Next, we find the sum of the midpoint times frequency column to get the total estimated views, and we find the number of posts made:

|  |  |  |  |
| --- | --- | --- | --- |
| **Number of views,** $x$ | **Frequency** | **Midpoint** | **Midpoint x frequency** |
| 0 $\leq x <$ 50,000 | 5 | 25,000 | 125,000 |
| 50,000 $\leq x<$ 100,000  | 7 | 75,000 | 525,000 |
| 100,000 $\leq x <$ 150,000 | 13 | 125,000 | 1,625,000 |
| 150,000 $\leq x <$ 200,000 | 1 | 175,000 | 175,000 |
| 200,000 $\leq x <$ 300,000 | 3 | 250,000 | 750,000 |
|  | 29 |  | 3,200,000 |

Finally, we find the mean by calculating 3,200,000 ÷ 29 = 110,344.83 views on average per fashion video.

To find the average number of views per cooking video, we calculate 1,625,301 ÷ 16 = 101,581.31 views on average per cooking video.

Therefore, we can see that, on average, she gets more views on her fashion videos than on her cooking videos.

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1. The first step here is to create a tally chart:

|  |  |
| --- | --- |
| **Age range (years)** | **Frequency** |
| 18-24 | || |
| 25-31 | ||| |
| 32-38 | | |
| 39-45 |  |
| 46-52 | || |
| 53-59 | | |
| 60-66 |  |
| 67-73 | | |

We place a mark in the frequency column each time the age comes up.

Next, we turn this into a frequency table:

|  |  |
| --- | --- |
| **Age range (years)** | **Frequency** |
| 18-24 | 2 |
| 25-31 | 3 |
| 32-38 | 1 |
| 39-45 | 0 |
| 46-52 | 2 |
| 53-59 | 1 |
| 60-66 | 0 |
| 67-73 | 1 |

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Now we can add our midpoint column, midpoint x frequency column, and the two sums:

|  |  |  |  |
| --- | --- | --- | --- |
| **Age range (years)** | **Frequency** | **Midpoint** | **Midpoint x frequency** |
| 18-24 | 2 | 21 | 42 |
| 25-31 | 3 | 28 | 84 |
| 32-38 | 1 | 35 | 35 |
| 39-45 | 0 | 42 | 0 |
| 46-52 | 2 | 49 | 98 |
| 53-59 | 1 | 56 | 56 |
| 60-66 | 0 | 63 | 0 |
| 67-73 | 1 | 70 | 70 |
|  | 10 |  | 385 |

Therefore, the average age is 385 ÷ 10 = 38.5 years old.

**Note:** Most of the information given in the original table wasn’t needed to answer the question. When doing statistical analysis this is often the case.

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