Histogram exercises with answers

arrow_back back to Histograms whether you want homework, some cover work, or a lovely bit of extra workout, this is the place for you. And the best of them all (well, more!) come with answers. Mathster content is a fantastic resource to create online, paper-based and homework-based assessments. They kindly allowed me to create 3 editable copies of each worksheet, complete with answers. Worksheet name 1 2 3 Histograms 1 2 3 Math Corbett keyboard_arrow_up Back to High Corbett Math offers outstanding, original exam style questions on each subject, as well as videos, past articles and 5 days. It's really one of the best websites around. On August 29, 2019, corbettmats draw the frequency density on the y axis while drawing a histogram y to frequency. The frequency density for each group is found using the formula: \text{frequency density} = \dfrac{\text{frequency}}{\text{class width}} under a grouped frequency table with a length of 71 string fragments. Build a histogram of data. [4 indications] we will need a frequency density for each class to build a histogram. By dividing the frequency of the first class over its width, the density \text{frequency} =\dfrac{8}{20-0} = 0.4 when we had calculated the frequency density with the remaining groups, so it's good to add a third column to the table containing the frequency density values, see the completed table. When this new column is finished, the only thing that remains is drawing histogram. With lengths on the x axis and frequency density in the y axis, each bar that we draw will have a width equal to the width of your class, and height equal to the corresponding frequency density. The resulting histogram is shown. Below is a histogram showing the time taken to complete a race. It took 44 people between 0 and 1.5 minutes. It took a few people between 3 and 4 minutes to work. [4 indications] we use information to answer this question to find out how much 1 small square of area is worth. Between 0 and 1.5 minutes includes all the first bar and some second. From 0 to 1 minute there are 10\12=120 small squares, and from 1 to 1.5 5\20=100 small squares (marked on the graph below for clarity). So, there are a total of 100+120=220 small squares between 0 and 1.5 minutes, and the question tells us it makes up 44 people. Therefore, 1 person is equal to 220 \div 44=5\text{ small squares}. Now, we get a reading from the graph that there are 11 \times 10 = 110 small squares between 3 and 4 minutes, so given that the 5 squares are small one person, there should be 110 \div 5 = 22\text{ people} that took between 3 and 4 minutes for the match to take place. To draw a histogram, we need to know the frequency density for each data row. The frequency density is calculated by dividing each frequency over the width of the class associated with it. This That we need to create a new column on the data table for frequency densities. The first row of the table has a plant height of 0 to 10 cm and a frequency of 6. As mentioned above, the frequency density is divided by band width, so the frequency density for the first row can be calculated as follows: \text{frequency density} = 6 \div10 = 0.6 By repeating this process for the remaining four rows, our completed frequency density column will look like the following column: now we are in a position to draw the histogram. The height will be on the X axis and the frequency density will be on the y axis. Since bandwidth is not compatible (the bandwidth of the category 20 - 24 cm is only 4 cm while the bandwidth for the handle is 30 - 50 cm 20 cm), this means that the width of the bars you pull will not be the same. Your completed histogram should seem like the following one: the number of values per class is represented by the area of each bar (not the height). We're told that 54 people can hold their breath for at least a minute, so that means the area of the bars from 60 seconds upwards represents 54 people. People who can hold their breath for 1 minute or more will be shown by the entire last bar (70 to 100 seconds) and the right hand section of the second to last bar (60 to 70 seconds). To work out the area in these two bars, we simply need to count small squares: (5 \times 15) + (15 \times 4) = 75 + 60 = 135 this is red in the histogram shown below. If 135 small squares represent 54 people, we can work out how many people represent a small square: if 54\text{ people} = 135\text{ small squares} then: \text{1 person } = \dfrac{135}{54} = 2.5\text{ small squares} Now that we know that 1 person with 2.5 small squares is shown, we need to work out how many small squares there are between 20 and 40 seconds. The number of small squares between 20 and 40 is: (5 \times 32) + (5 \times 20) = 160 + 100 = 260 this is shown in green on the graph below. So the number of people who can hold their breath between 20 and 40 seconds is: \dfrac{260}{2.5} = 104\text{ people} a) Since we take data from histograms, we can see the frequency density and band width, but we have to work out how many (frequency) rides for 30 kilometers or less. The key formula when we deal with histograms is: \text{frequency density} = \dfrac{\text{frequency}}{\text{bandwidth}} If we need to work the frequency, then we simply need to reset this formula: if \text{frequency density} = \dfrac{\text{frequency}}{\text{bandwidth}} then \text{Frequency} = \text{ frequency density}\times\text{ bandwidth} The number of riders (frequencies) mounted between 0 and 20 kilometers can be calculated as follows. : 4\times20 = 80\text{ Riders} Number of Riders (the That between 20 and 30 kilometers can be calculated as follows: 10\times10 = 100\text{ riders} so the number of riders who have boarded between 0 and 30 kilometers is: 80+100=180\text{ riders} b) In order to work out the average length of the journey, we need to work out how many riders there are in total. To do this, we need to work out how many riders ride between 0 - 20 km, 20 - 30 km, 30 - 54 km etc. We now know from the previous question that 80 rides were drove between 0 and 20km and another 100 drove between 20 and 30km. In the category 30 to 57 kilometers, the band width is 27 km and the frequency density is 2, so the number of riders can be calculated as follows: 27\times2 = 54\text{ riders} in category 57 -7 We have 0 kilometers, a band width of 13 kilometers and a frequency density of 9, so the number of riders can be calculated as follows: 13\times9 = 117\text{ riders} in the 70 – 90 kilomes category , we have a band width of 20 km and a frequency density of 6, so the number of riders can be calculated as follows: 20\times6 = 120\text{ riders} Although we now have exactly how many riders ride in each remote category, we can't know exactly how far each rider is since we're dealing with grouped data. In the 0-20 kilometer category, 80 rakabzan could cycle 1 kilometer or 19 kilometers. What we need to do is assume that the distance each cyclist rides is the midpoint of each distance category (which is why it's an estimated average and not an accurate average). The easiest thing for us to do is to tabate our data, with a column for the midpoint of each remote category, another column for frequency (number of riders) and another column for the midpoint multiplied by frequency (this last column is combined to work out the total distance traveled by all riders in that category because to work out the average, we need to split the total distance traveled by all riders by number Riders). Tabrated data should look like the following: the sum of the frequency column is the total number of riders. The sum of the 'midpoint multiplied in the frequency column' is the total distance traveled by all riders. So the estimated average can be calculated as follows: \text{estimated average} = 22678.5\text{ km} \div\text471\text{ riders} \approximately 48\text{ km} a) In order to complete the rest of histogram, we need to work out the frequency density for the length categories that are currently drawn on histogram. The frequency density for the length category of 0-4 cm can be calculated as follows: \text{frequency density} = 32 \div 4 = 8 frequency densities for the length category 10- 20 cm can be calculated as follows: \text{frequency density} = 22 \div 10 2.2 Frequency density for category 20 – 40 cm long can be calculated as follows: \text{frequency density} = 42 \div 20 = 2.1 frequency density for category 40 – 45 cm long can be calculated as follows: \text{frequency density} = 30 \div 5 = 6 frequency density for length category 55 - 70 cm can be calculated as follows :\text{Density Frequency} = 9 \div 15 = 0.6 Now that we have worked out the frequency density for each category of lengths, we can now draw them on histograms, with the result similar to: b) For this part of the question we need to fill the gaps in the frequency column of the table. To do this, we need to get a frequency density reading of the histogram for the 2-length categories. Reading from histograms we see that the frequency density for the 4-10 cm category is 3.5 cm, and the frequency density for the category 45 to 55 cm is 4.6. All we have to do is re sort the frequency density formula so that we can work the frequency since \text{frequency density} = \dfrac{text{frequency}}{\text{bandwidth}} then \text{Frequency} =\text{frequency density}\times\text{bandwidth} Therefore, the frequency for category 4 - 10 cm long can be calculated as follows: 3.5\times6=21 frequencies for category 45 - 55 cm long can be calculated as follows: : 4.6\times10=46 a) The key piece of information in this question is that 15 bags of flour weigh between 35 and 40 pounds. What we have to do is look and see what area this represents from the hetogram. The bar area of 35 - 40 pounds (randomly not working from the total bar area of 30 - 40 pounds!) can be calculated as follows: 2.5\times30\text{ small squares} = 75\text{ small squares} so we can conclude that 15 bags of flour are represented by 75 small squares. If 15\text{ bags} = 75\text { small squares} then 1\text{ bag} = 5\text { small squares} All we need to do now is work out how many small squares there are from 80 pounds upwards. Between £80 and £95 there are 75 small squares and between £95 and £100, there are another 125 small squares, which gives us a total of 200 small squares. Since the small 5 squares represent a single bag of flour, then 200 squares represent 40 bags of flour. b) The answer to part a) can only be an estimate because we deal with grouped data. We have hypothesly assumed that the number of bags weighing between 80 and 95 pounds is {3}{5} of the number of bags of flour that weigh between 70 and 95 pounds. In one extreme, it is possible that all these bags of flour are less than 80 pounds, and in the other extreme, it is likely that they may all weigh more than 80 pounds. c) We know from this question that there are a total of 185 bags of flour. so the median weight is a bag of flour of the 93^{\text{rd}} bag (since 93 is the 'mid-point' of 185). So we need to work out which band weighs 93^{\text{rd}} the flour bag falls. This is going to be difficult (impossible) at this stage since we don't know how many flour bags in the category 30 - 40 pounds, 40 - 55 pounds category etc. We know from the first question that 15 bags of flour weigh between 35 and 40 pounds. Because this is half the total 30 to 40 pounds category, the number of bags is between 30 and 40 pounds: 15\times2 = 30\text{ bag} in category 40 - 55 pounds, area 1.5 times the bar 30 to 40 It's pound, so this represents: 30\times1.5 = 45\text{ bag} so far we've accounted for the first 75 bags of flour (50+75=125) so it hasn't reached 93^{text{rd}} flour bags yet. The 65-55 pound category has the same width as the 30-40 pound category. If we compare this area to a category of 30 –40 pounds, its area is 25 small squares larger than the 30-40 pound category. So when we know what the area of the small 25 squares shows, we can add this to 30 (the number of bags shown by category 30 – 40 pounds). We know from the first question that the small 5 squares are related to 1 bag, so the small 25 squares will match 5 bags. So the category 55 - 65 pounds corresponds to 35 bags. Since there are 30 bags in category 30 - 40 pounds and a further 45 bags in the category 40 - 55 pounds, there are 75 bags that weigh between 30 and 55 pounds. So there are 55 - 65 pound account handles for 76^{\text{th}} bags to 110^{\text{th}} bags (110 since there are 75 bags between 30 and 55 pounds and 35 bags between 55 and 65 pounds). We are trying to find the weight of the 93^{\text{rd}} bag, so we know that it should be in the weight category of 55 to 65 pounds. We are currently in a position to calculate the estimated weight of the 93^{\text{rd}} bag (this bit is hard!). By subtracting 75 bags weighing less than 55 pounds from 93, we can work out that the 93^{\text{rd}} bag 18^{\text{th}} will be between 35 bags between 55 and 65 pounds. We can see this as \frac{18}{35}. So where's this fall in the weight category? Will fall \frac{18}{35} way between 55 – 65 pounds. Since this category weighs 10 pounds, we need to do the following calculation: \dfrac{18}{35}\times10=5.14\text{pounds} since the category starts at 55 pounds, then the middle bag weight (93^{\text{rd}}) is a 55+5.14=60.14\text{ pound} bag (this last part looks complicated, but only because it's not easy to deduct. If there are 20 bags in category 55 - 65 pounds, and it's 10^{\text{ th}} bag in this category that represents the median, of 10^{\text{th}} bags in category exactly half way through the 20 bags in Category, then its estimated weight will simply be half way between 55 and 65 pounds, so weigh 60 pounds.) Pound.)

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