



THIRD SPACE
LEARNING

Diagnostic Questions

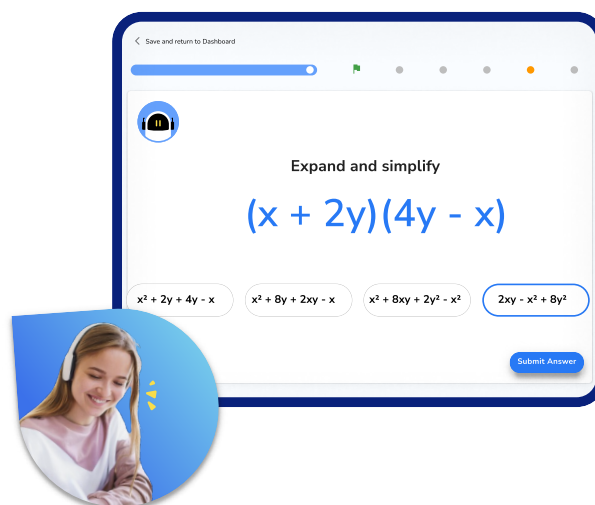
Histograms | Statistics

This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **histograms** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

How to use the questions in this resource

There are 10 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

Diagnostic Questions: Histograms

1. What would the vertical axis be labelled when constructing a histogram to show the weight of students in a school?

A) Weight	B) Frequency density
C) Cumulative frequency	D) Frequency

2. The heights of sunflowers in a field are recorded in the table below. A histogram is going to be used to represent the data. Calculate the value of the highlighted cell:

Height (cm)	Frequency	Frequency Density
$0 \leq l < 5$	25	
$5 \leq l < 20$	90	
$20 \leq l < 30$	50	
$30 \leq l < 40$	30	

A) 6	B) 90
C) 4.5	D) 115

Diagnostic Questions: Histograms

3. A garden centre records the mass of every bag of seeds they have ready to sell. The data is to be presented as a histogram. Which bar has the lowest frequency density?

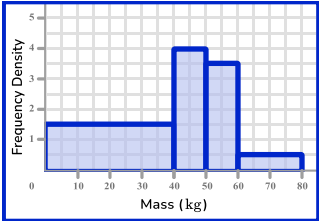
Mass (g)	Frequency	Frequency Density
$0 \leq m < 25$	225	A
$25 \leq m < 125$	700	B
$125 \leq m < 200$	225	C
$200 \leq m < 250$	200	D

A) A	B) B
C) C	D) D

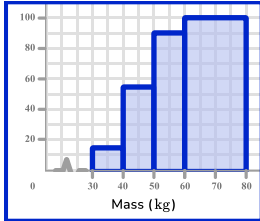
4. The mass for all 100 members of a junior rugby club is recorded in the table below. Which histogram correctly represents the data?

Mass (kg)	Frequency
$30 < m \leq 40$	15
$40 < m \leq 50$	40
$50 < m \leq 60$	35
$60 < m \leq 80$	10

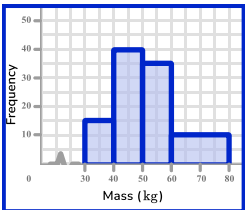
A)



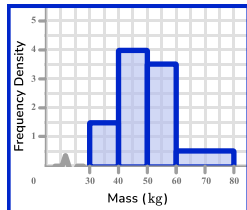
B)



C)

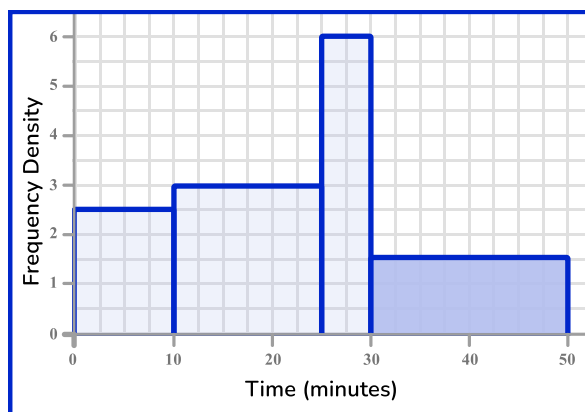


D)



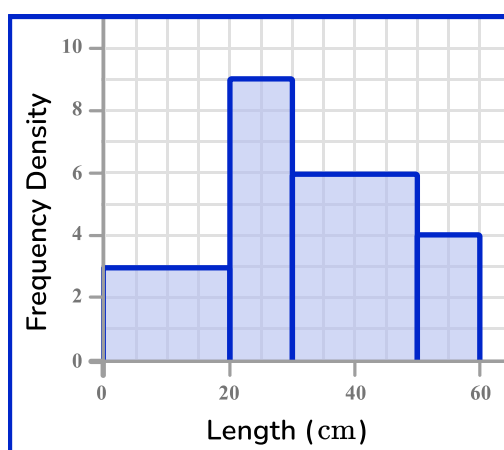
Diagnostic Questions: Histograms

5. This histogram represents the times taken for members of a breakfast club to complete a crossword puzzle. How many people are represented by the highlighted bar?



A) 30	B) 60
C) 75	D) 15

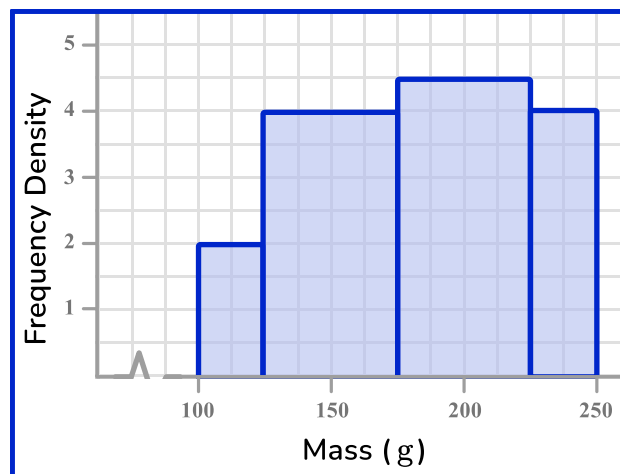
6. This histogram represents the length of the snakes held by the reptile house at the zoo. How many snakes are there at the zoo?



A) 22	B) 330
C) 715	D) 310

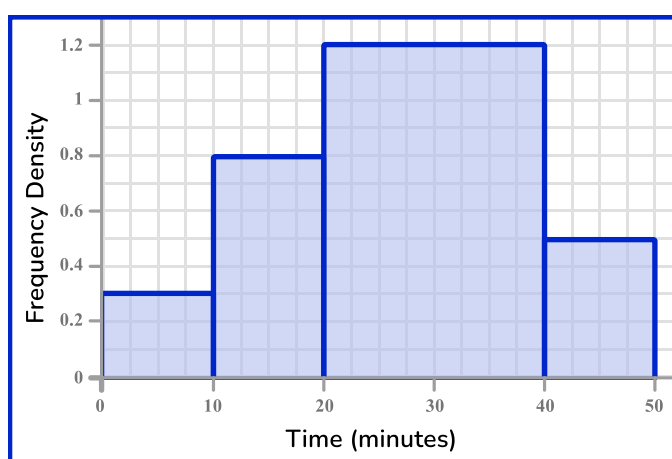
Diagnostic Questions: Histograms

7. This histogram represents the mass of the pre-packed bags of sweets at a candy store. Find an estimate for the number of bags with mass greater than 200g



A) 325	B) 213
C) 212.5	D) 100

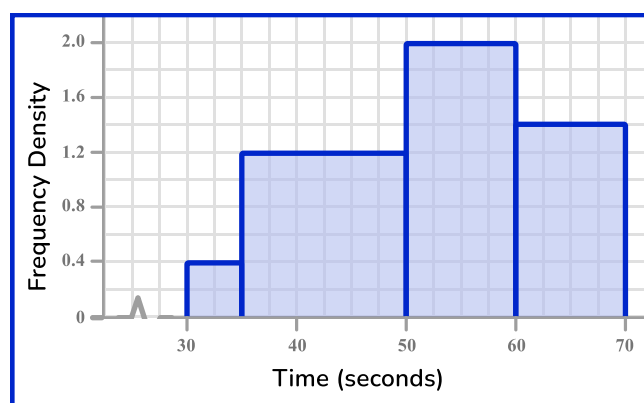
8. This histogram represents the times taken for some children in year 8 to solve a rubik's cube. Estimate the median time taken to solve a rubik's cube.



A) 25 minutes	B) 30 minutes
C) 20 minutes	D) 27 minutes 30 seconds

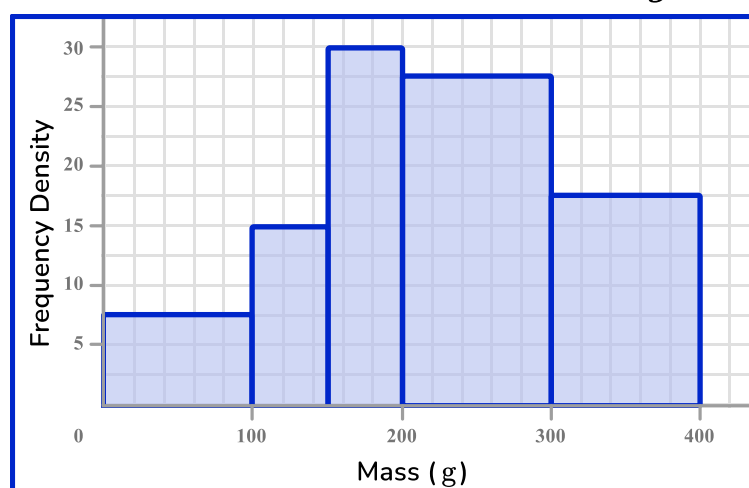
Diagnostic Questions: Histograms

9. This histogram represents the times taken for some year 11 students to complete a cup stacking task. The students are ranked into three equal groups based on their speed at the task. What task time is the cut off to be in the fastest group?



A) 58 seconds	B) 48.3 seconds
C) 35 seconds	D) 42.5 seconds

10. This histogram represents the mass of bags of flour in a shop. Estimate how many bags of flour there are with a mass between $250g$ and $350g$.



A) 45	B) 4500
C) 2250	D) 3125

Diagnostic Questions: Histograms Answers

1. What would the vertical axis be labelled when constructing a histogram to show the weight of students in a school?

- A) Weight Student confused labelling of horizontal and vertical axes
- B) Frequency density **Correct answer**
- C) Cumulative frequency Student confused a histogram with a cumulative frequency diagram
- D) Frequency Student does not understand the use of a histogram

2. The heights of sunflowers in a field are recorded in the table below. A histogram is going to be used to represent the data. Calculate the value of the highlighted cell:

Height (cm)	Frequency	Frequency Density
$0 \leq l < 5$	25	
$5 \leq l < 20$	90	
$20 \leq l < 30$	50	
$30 \leq l < 40$	30	

- A) 6 **Correct answer**
- B) 90 Student gave the frequency, not the frequency density
- C) 4.5 Student used the upper bound of the class width, rather than the class width itself
- D) 115 Student calculated the cumulative frequency

Diagnostic Questions: Histograms Answers

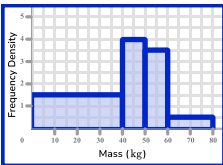
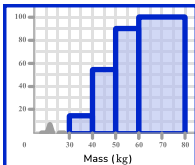
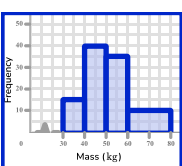
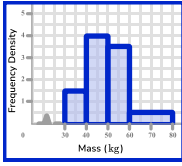
3. A garden centre records the mass of every bag of seeds they have ready to sell. The data is to be presented as a histogram. Which bar has the lowest frequency density?

Mass (g)	Frequency	Frequency Density
$0 \leq m < 25$	225	<i>A</i>
$25 \leq m < 125$	700	<i>B</i>
$125 \leq m < 200$	225	<i>C</i>
$200 \leq m < 250$	200	<i>D</i>

- A) A Student chose the smallest class width
 B) B Student assumed the largest class width gives the lowest frequency density
 C) **C Correct Answer**
 D) D Student chose the lowest frequency

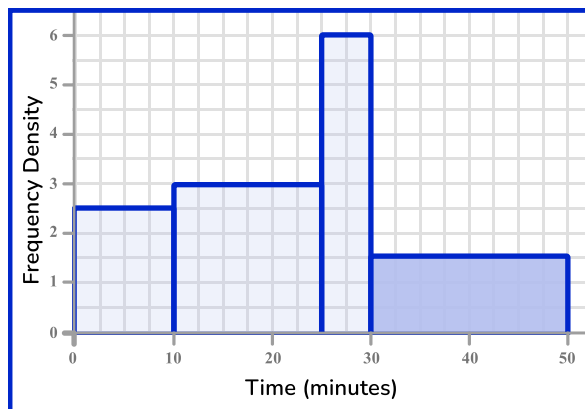
4. The mass for all 100 members of a junior rugby club is recorded in the table below. Which histogram correctly represents the data?

Mass (kg)	Frequency
$30 < m \leq 40$	15
$40 < m \leq 50$	40
$50 < m \leq 60$	35
$60 < m \leq 80$	10

<p>A) </p> <p>Student made an error with the class width of the first bar</p>	<p>B) </p> <p>Student confused cumulative frequency and frequency density</p>
<p>C) </p> <p>Student confused frequency and frequency density</p>	<p>D) </p> <p>Correct answer</p>

Diagnostic Questions: Histograms Answers

5. This histogram represents the times taken for members of a breakfast club to complete a crossword puzzle. How many people are represented by the highlighted bar?



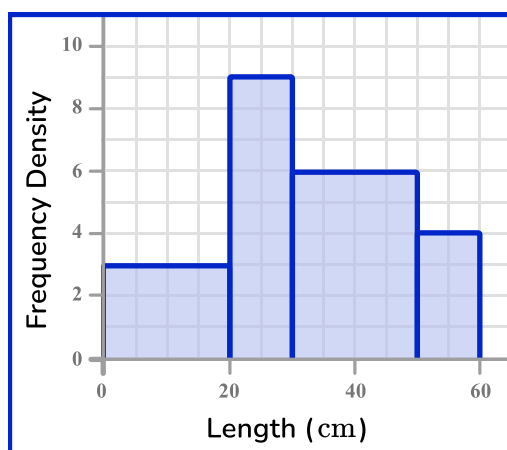
A) 30 Correct answer

B) 60 Student multiplied frequency density by the class midpoint, not class width

C) 75 Student multiplied frequency density by the class maximum, not class width

D) 15 Student miscalculated class width as 10, not 20

6. This histogram represents the length of the snakes held by the reptile house at the zoo. How many snakes are there at the zoo?



A) 22 Student used the vertical axis as frequency, not frequency density

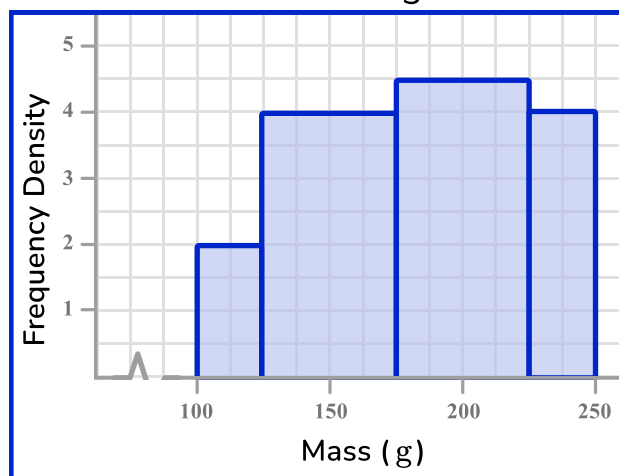
B) 330 Student treated the bars as being equal width (15 wide)

C) 715 Student multiplied by interval midpoints instead of class width

D) 310 Correct answer

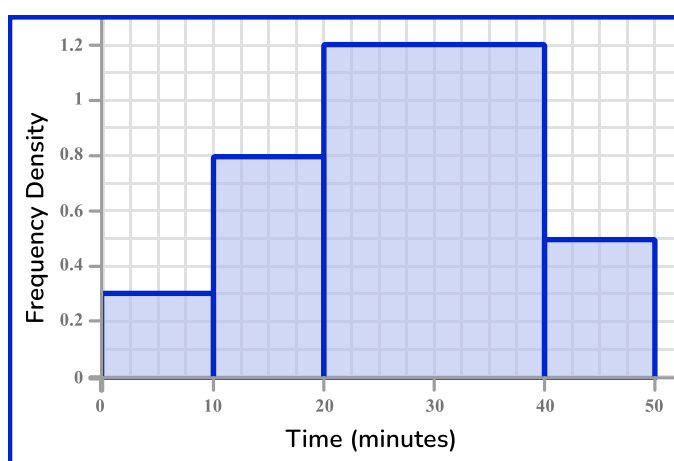
Diagnostic Questions: Histograms Answers

7. This histogram represents the mass of the pre-packed bags of sweets at a candy store. Find an estimate for the number of bags with mass greater than 200g.



- A) 325 Student used the whole of the third bar, instead of half of it
 B) 213 Correct answer
 C) 212.5 Student calculated correctly but did not use the problem context problem
 D) 100 Student used only the fourth bar

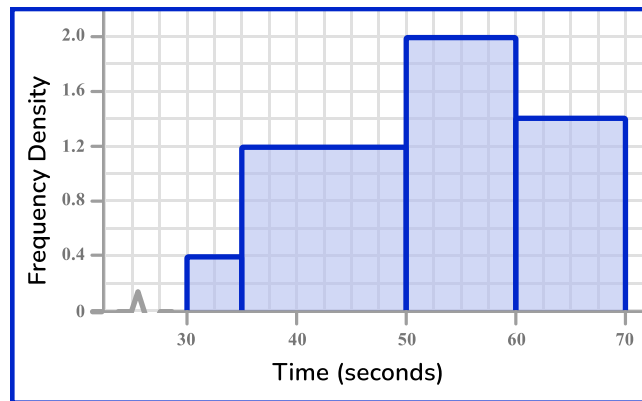
8. This histogram represents the times taken for some children in year 8 to solve a rubik's cube. Estimate the median time taken to solve a rubik's cube.



- A) 25 minutes Student found the midpoint of the horizontal scale
 B) 30 minutes Student found the midpoint of the largest bar
 C) 20 minutes Student gave the value at the boundary of 2nd and 3rd bars
 D) 27 mins 30 secs Correct answer

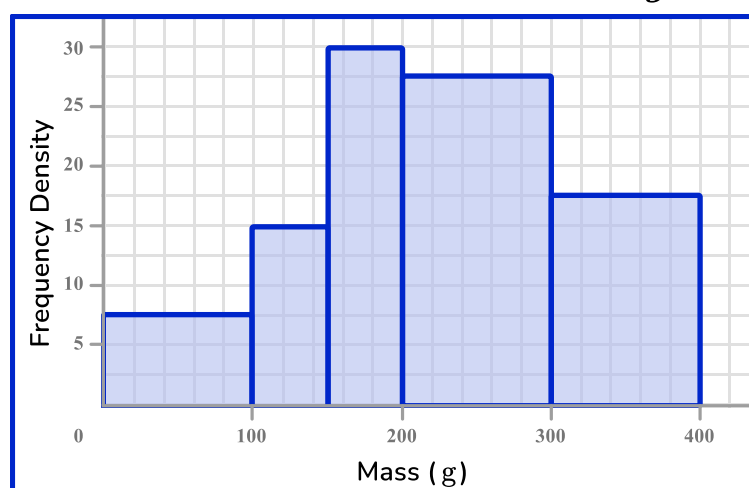
Diagnostic Questions: Histograms Answers

9. This histogram represents the times taken for some year 11 students to complete a cup stacking task. The students are ranked into three equal groups based on their speed at the task. What task time is the cut off to be in the fastest group?



- A) 58 seconds Student found the cut off for the slowest third
 B) 48.3 seconds **Correct answer**
 C) 35 seconds Student used the first bar only
 D) 42.5 seconds Student calculated the proportion from the second bar incorrectly

10. This histogram represents the mass of bags of flour in a shop. Estimate how many bags of flour there are with a mass between 250g and 350g.



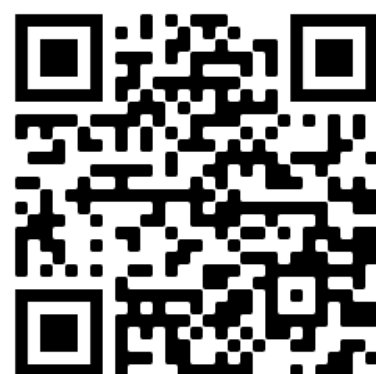
- A) 45 Student used both scales incorrectly
 B) 4500 Student included the full amounts from 4th and 5th bars
 C) 2250 **Correct answer**
 D) 3125 Student found the number of bags with mass greater than 250g

Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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