



F05-30min Percentiles: 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 For each statement about percentiles, write down whether it is True or False.

(i) Percentiles divide an ordered set of data into 100 equal-sized groups. (1)

(ii) The 90th percentile of a data set is smaller than its 10th percentile. (1)

(iii) Linear interpolation can be used to estimate a percentile from grouped (continuous) data. (1)

(Total for Question 1 is 3 marks)

2 There are 30 values in an ordered list. Work out the position of the 90th percentile.

(Total for Question 2 is 1 mark)

3 The weights, in kg, of 11 parcels, listed in order, are:

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Find the 60th percentile of the weights.

(Total for Question 3 is 2 marks)

4 Priya is investigating how long Year 11 students at her school spend on their phones each evening. There are 180 Year 11 students, split unevenly across 6 tutor groups.

(a) Priya wants her sample to be representative of all Year 11 students. Describe a suitable sampling method she could use, and explain why it would give a representative sample. (2)

(b) Priya collects screen-time data (t minutes) from a sample of 50 students, shown in the table. (2)

Screen time (t minutes)	Frequency	Cumulative frequency
$0 < t \leq 30$	4	4
$30 < t \leq 60$	8	12
$60 < t \leq 90$	20	32
$90 < t \leq 120$	10	42
$120 < t \leq 150$	8	50

Work out the position of the 80th percentile within the cumulative frequency total.

.....
(c) Write down the class interval that contains the 80th percentile. (1)

.....
(d) Use linear interpolation to estimate the 80th percentile of the screen-time data. (3)

(e) Priya read a claim online that 'at least 80% of Year 11 students spend under 180 minutes (3 hours) on their phone each evening.' Use your answer to part (d) to comment on this claim. (2)

(Total for Question 4 is 10 marks)

- 5** The weight, w (kg), of recycling collected from 60 households in one week is shown in the table.

Weight (w kg)	Frequency	Cumulative frequency
$0 < w \leq 5$	8	8
$5 < w \leq 10$	16	24
$10 < w \leq 15$	20	44
$15 < w \leq 20$	10	54
$20 < w \leq 25$	6	60

- (a)** Write down the position of the median within the cumulative frequency total. **(1)**

-
(b) Which class interval contains the median? **(1)**

-
(c) Use linear interpolation to estimate the median weight of recycling collected per household. **(3)**

(Total for Question 5 is 5 marks)

- 6 The time, t (minutes), taken by 50 customers to be served at a bank, is shown in the table.

Time (t minutes)	Frequency	Cumulative frequency
$0 < t \leq 5$	6	6
$5 < t \leq 10$	14	20
$10 < t \leq 15$	18	38
$15 < t \leq 20$	12	50

- (a) Work out the position of the 44th percentile within the cumulative frequency total. (2)

- (b) Write down the class interval that contains the 44th percentile. (1)

(Total for Question 6 is 3 marks)

- 7 The distances, d (km), cycled by 60 cyclists in a sponsored bike ride are shown in the table.

Distance (d km)	Frequency	Cumulative frequency
$0 < d \leq 10$	8	8
$10 < d \leq 20$	20	28
$20 < d \leq 30$	20	48
$30 < d \leq 40$	12	60

Use linear interpolation to estimate the 55th percentile of the distances cycled.

(Total for Question 7 is 3 marks)

- 8** The waiting times, in minutes, for 8 customers at Shop A and 8 customers at Shop B, listed in order, are:

Shop A: 2.0, 2.4, 2.6, 2.9, 3.1, 3.4, 3.6, 4.0

Shop B: 1.8, 2.1, 2.5, 2.8, 3.0, 3.5, 4.2, 4.6

- (a)** Find the median (the 50th percentile) waiting time for each shop. (2)

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- (b)** The interquartile range of Shop A's waiting times is 1.0 minutes and Shop B's is 1.4 minutes. State which shop has more consistent waiting times, giving a reason. (1)

(Total for Question 8 is 3 marks)

Mark scheme · F05-30min Percentiles: 30-minute Pack

Question 1

- (i) **B1** True cao
- (i) **Answer: True**
- (ii) **B1** False cao
- (ii) **Answer: False**
- (iii) **B1** True cao
- (iii) **Answer: True**

Question 2

- **B1** 27 cao
- **Answer: 27**

Question 3

- **M1** position = $0.6 \times 11 = 6.6$, round up to 7
- **A1** 8 cao
- **Answer: 8 kg**

Question 4

- (a) **M1** stratified sampling, sampling from each tutor group in proportion to its size (oe)
- (a) **A1** this ensures every tutor group is represented in the sample in the same proportion as in the whole year group, so the sample reflects the whole year group (oe)
- (a) **Answer: Stratified sampling: take a number of students from each tutor group in proportion to its size, so the sample fairly represents every group.**
- (b) **M1** 0.8×50
- (b) **A1** 40 cao
- (b) **Answer: 40**
- (c) **B1** $90 < t \leq 120$ cao
- (c) **Answer: $90 < t \leq 120$**
- (d) **M1** $(40 - 32) / 10 \times 30$, oe
- (d) **M1** $90 + \dots$
- (d) **A1** 114 cao
- (d) **Answer: 114 minutes**
- (e) **B1** $114 < 180$, so at least 80% of students in the sample spend under 180 minutes (oe)
- (e) **B1** the claim is supported by the data (oe justified conclusion)
- (e) **Answer: The claim is supported - the 80th percentile (114 minutes) is already well under 180 minutes, so at least 80 % of students spend under 180 minutes on their phone.**

Question 5

- (a) **B1** 30 cao
- (a) **Answer: 30**
- (b) **B1** $10 < w \leq 15$ cao
- (b) **Answer: $10 < w \leq 15$**
- (c) **M1** $(30 - 24) / 20 \times 5$, oe
- (c) **M1** $10 + \dots$
- (c) **A1** 11.5 cao
- (c) **Answer: 11.5 kg**

Question 6

- (a) **M1** 0.44×50
- (a) **A1** 22 cao
- (a) **Answer: 22**
- (b) **B1** $10 < t \leq 15$ cao
- (b) **Answer: $10 < t \leq 15$**

Question 7

- **M1** position = $0.55 \times 60 = 33$
- **M1** $20 + ((33 - 28) / 20) \times 10$, oe
- **A1** 22.5 cao
- **Answer: 22.5 km**

Question 8

- (a) **B1** Shop A median = 3.0 cao
- (a) **B1** Shop B median = 2.9 cao
- (a) **Answer: Shop A: 3.0 minutes; Shop B: 2.9 minutes**
- (b) **B1** Shop A, because its interquartile range (1.0 min) is smaller than Shop B's (1.4 min), oe
- (b) **Answer: Shop A, because its interquartile range (1.0 minutes) is smaller than Shop B's (1.4 minutes).**