

1. Here are the weights, in kilograms, of five babies.

2.69                  3.44                  4.52                  3.47                  3.20

Find the standard deviation of these weights.

You must show your working.

Give your answer correct to 3 significant figures.

$$\sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$
$$\sigma = \sqrt{\frac{61.781}{5} - \left(\frac{17.32}{5}\right)^2}$$
$$= 0.597 \text{ (3 s.f.)}$$

$$\begin{aligned}\sum x &= 2.69 + 3.44 + 4.52 + \\ &\quad 3.47 + 3.20 \\ &= 17.32\end{aligned}$$

$$\begin{aligned}\sum x^2 &= (2.69)^2 + (3.44)^2 + (4.52)^2 \\ &\quad + (3.47)^2 + (3.20)^2 \\ &= 61.781\end{aligned}$$

$$\underline{\quad 0.597 \quad} \text{ kg}$$

(Total for Question 1 is 3 marks)

2.  $n = 20$   
 $\sum x = 240$   
 $\sum x^2 = 3000$

Work out the standard deviation.

Give your answer correct to 3 decimal places.

$$\sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$
$$= \sqrt{\frac{3000}{20} - \left(\frac{240}{20}\right)^2}$$
$$= 2.449 \text{ 3dp}$$

$$\underline{\quad 2.449 \quad}$$

(Total for Question 2 is 3 marks)

3.  $n = 15$

$$\sum y = 72$$

$$\sum y^2 = 396$$

Calculate the standard deviation.

Give your answer correct to 1 decimal place.

$$\begin{aligned}\sigma &= \sqrt{\frac{396}{15} - \left(\frac{72}{15}\right)^2} \\ &= 1.8 \quad (1 \text{ dp})\end{aligned}$$

.....  
1.8

(Total for Question 3 is 3 marks)

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4. The number of errors,  $x$ , on each of 25 pages of a magazine were recorded.

Here are the summarised results.

$$\sum x = 195$$

$$\sum x^2 = 6840$$

Calculate the standard deviation of the number of errors.

Give your answers to 3 significant figures.

$$\begin{aligned}\sigma &= \sqrt{\frac{6840}{25} - \left(\frac{195}{25}\right)^2} \\ &= 14.6 \quad 3 \text{ sf}\end{aligned}$$

.....  
14.6

(Total for Question 4 is 3 marks)

5. Some tigers were weighed/  
The mean weight of the tigers was 230 kg.

$x$  kg represents the weight of a tiger where  $\sum x = 3450$

- (a) Work out how many tigers were weighed.

$$\frac{\sum x}{n} = \text{mean}$$

$$\frac{3450}{n} = 230$$

$$n = \frac{3450}{230}$$

$$\frac{\quad}{\quad} \dots\dots\dots 15 \quad (2)$$

$$\sum x^2 = 841\,250$$

- (b) Work out the standard deviation.

$$\sigma = \sqrt{\frac{841250}{15} - (230)^2}$$

$$= 56.42103627$$

$$\frac{56.4}{\quad} \dots\dots\dots \text{kg} \quad (3 \text{ s.f.}) \quad (3)$$

(Total for Question 5 is 5 marks)

6. Here are the weights, in kilograms, of five babies.

2.69

3.44

4.52

3.47

3.20

Find the standard deviation of these weights.

You must show your working.

Give your answer correct to 3 significant figures.

$$\sum x = 17.32$$

$$\sum x^2 = 61.781$$

$$\sigma = \sqrt{\frac{61.781}{5} - \left(\frac{17.32}{5}\right)^2}$$

.....0.597..... kg

(Total for Question 6 is 3 marks)

7. Ted throws the javelin.

The table gives information about the distances he threw the javelin last year.

Distance ( $d$ metres)	$x$	Frequency	$fx$
$0 < d \leq 40$	20	25	500
$40 < d \leq 60$	50	36	1800
$60 < d \leq 80$	70	14	980
$80 < d \leq 90$	85	5	425
		<u>80</u>	<u>425</u>

(a) Calculate an estimate for the mean distance.

$$\frac{500 + 1800 + 980 + 425}{80} = 46.3125$$

.....46.3125 metres  
(3)

(b) Calculate an estimate for the standard deviation of the distribution.  
Give your answer correct to 1 decimal place.  
You may use  $\sum f d^2 = 204\,725$

$$\sigma = \sqrt{\frac{204725}{80} - (46.3125)^2} = 20.4 \text{ (1dp)}$$

.....20.4 metres  
(2)

(Total for Question 7 is 5 marks)

8. Rebecca recorded the time she took to travel to the gym on each of 22 days. The table gives information about these times.

Time ( $x$ minutes)	Frequency ( $f$ )
$0 < x \leq 5$	2
$5 < x \leq 10$	4
$10 < x \leq 15$	3
$15 < x \leq 20$	6
$20 < x \leq 25$	5
$25 < x \leq 30$	2

5  
 30  
 37.5  
 105  
 112.5  
 55  


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 345

Calculate an estimate for the standard deviation of these times.

You may use  $\Sigma fx^2 = 6587.5$ .

$$\sigma = \sqrt{\frac{6587.5}{22} - \left(\frac{345}{22}\right)^2}$$

$$= 7.315216791$$

7.32 (3sf)  
 ..... minutes

**(Total for Question 8 is 4 marks)**

9. The table gives information about the time spent, in minutes, by 50 people listening to the radio last Thursday.

Time spent ( $x$ minutes)	$x$	Frequency
$0 < x \leq 30$	15	12
$30 < x \leq 40$	35	25
$40 < x \leq 60$	50	8
$60 < x \leq 100$	80	5

$$\begin{array}{r}
 fx^2 \\
 2700 \\
 30625 \\
 20000 \\
 32000 \\
 \hline
 85325
 \end{array}$$

- (a) Calculate an estimate for the mean time.  
You may use  $\sum fx = 1855$ .

$$\frac{1855}{50} = 37.1$$

.....37.1.....minutes  
(2)

- (b) Calculate the estimate for the standard deviation of the distribution.  
Give your answer correct to 1 decimal place.

$$\sum fx^2 = 85325$$

$$\begin{aligned}
 \sigma &= \sqrt{\frac{85325}{50} - (37.1)^2} \\
 &= 18.2 \quad (1dp)
 \end{aligned}$$

.....18.2.....minutes  
(3)

(Total for Question 9 is 5 marks)

10 This table gives information about the distance,  $d$  km, travelled by each of 136 people to go to a music concert.

Distance ( $d$ km)	Number of people ( $f$ )		
$40 < d \leq 45$	$42.5 \times$	6	255
$45 < d \leq 50$	$47.5 \times$	19	902.5
$50 < d \leq 60$	$55 \times$	53	2915
$60 < d \leq 70$	$65 \times$	37	2405
$70 < d \leq 90$	$80 \times$	15	1200
$90 < d \leq 150$	$120 \times$	6	720

(a) Calculate an estimate for the mean distance.

8397.5

$$\frac{8397.5}{136} = 61.74632353$$

61.7 (3sf)  
..... km  
(3)

(b) Calculate an estimate for the standard deviation of the distances.  
Give your answer correct to 2 decimal places.

You may use  $\sum fd^2 = 552\,756.25$

$$\sigma = \sqrt{\frac{552756.25}{136} - \left(\frac{8397.5}{136}\right)^2}$$

$$= 15.87 \text{ (2dp)}$$

15.87 km  
..... km  
(2)

(Total for Question 10 is 5 marks)