

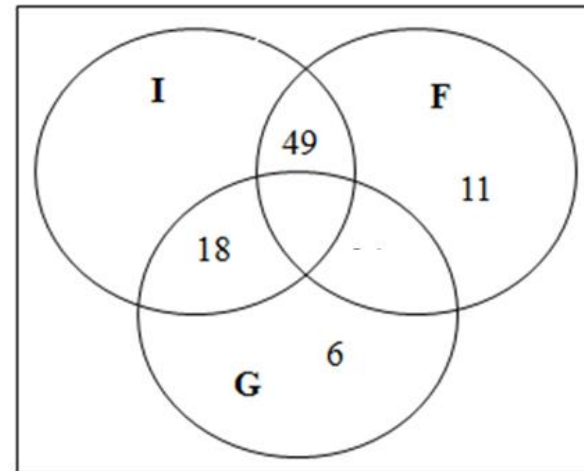
# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

1

200 people were asked which of Italy, France and Germany they had visited.

- 28 had visited all 3 countries
- 46 had visited Italy & Germany
- 77 had visited France & Italy
- 62 had visited France & Germany
- 112 had visited Italy
- 122 had visited France
- 86 had visited Germany



Copy & complete the Venn diagram to show this information, and use it to find the probability that a randomly selected person had been to:

- (a) Germany, given that they had been to France
- (b) Italy, given they had not been to France
- (c) France, given they had been to Italy and Germany

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

2

You can disprove a statement by providing a **counter example**, i.e. an example where the statement isn't true.

For example, if I want to disprove the statement '*all prime numbers are odd*' I can say '*2 is a prime number. 2 is not odd. Therefore not all prime numbers are odd*'.

By finding a **counter example** in each case, disprove the following statements:

(a)  $\sqrt{x^2 + y^2} = x + y$  for all  $x, y \in \mathbb{R}$

(b) If  $p$  is a non-zero integer then  $\frac{1}{p^2} < \frac{1}{p}$

(c)  $n^2 - n - 1$  is a prime number for all numbers  $n$  in the set  $\{n \in \mathbb{Z}: n > 2\}$

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

3

The table summarises the distances travelled by 150 students to college each day.

- (a) Calculate an estimate of the median distance
- (b) Calculate an estimate of the mean distance

<i>Distance (nearest km)</i>	<i>Number of students</i>
0-2	14
3-5	24
6-8	70
9-11	32
12-14	8
15-17	2

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

4

The speeds of vehicles passing a checkpoint were measured over a period of one hour, to the nearest mph. The data collected is shown in the grouped frequency table.

<i>Speed (mph)</i>	21-30	31-40	41-50	51-60	61-65	66-70	71-75
<i>No. of vehicles (f)</i>	4	7	38	42	5	3	1

Calculate the difference, to two decimal places, between the median and the mean estimated speeds. You will need to use **linear interpolation** to find the median.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

5

What are the advantages and disadvantages of the following:

- (a) Sample
- (b) Census
- (c) Simple random sampling
- (d) Opportunity sampling
- (e) Stratified sampling
- (f) Systematic sampling
- (g) Quota sampling

TAP FOR ANSWERS

# BHASVIC MATHS

## A1 DOUBLES ASSIGNMENT 2B

6

You will learn more about this new notation in class but here is a quick intro.  
The  $\Sigma$  sign means sum or add up so

$\sum_{r=1}^5 r$  means add up all the numbers from 1 to 5 like this

$$\sum_{r=1}^5 r = 1 + 2 + 3 + 4 + 5$$

and  $\sum_{r=1}^4 r(r+1)$  means this

$$\sum_{r=1}^4 r(r+1) = 1 \times (1+1) + 2 \times (2+1) + 3 \times (3+1) + 4 \times (4+1) = 2 + 6 + 12 + 20 = 40$$

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

6

Use these examples to help you evaluate

a)  $\sum_{r=1}^3 (r + 3)$

b)  $\sum_{r=1}^4 2$

c)  $\sum_{r=1}^4 r^2$

d)  $\sum_{r=1}^4 (r^2 + 2)$

e) Look at your answers to parts b) and c). Can you see the link with the answer to d)?

TAP FOR ANSWERS

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

7

For a set of 10 numbers:

$$\sum x = 50, \sum x^2 = 310$$

For a different set of 15 numbers:

$$\sum y = 86, \sum y^2 = 568$$

Find the mean and standard deviation of the combined set of 25 numbers.

TAP FOR ANSWERS



# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

8

A particle moves along a straight line. The particle accelerates from rest to a speed of  $10 \text{ m s}^{-1}$  in 15 s. The particle then moves at a constant speed of  $10 \text{ m s}^{-1}$  for a period of time. The particle then decelerates uniformly to rest. The period of time for which the particle is travelling at a constant speed is 4 times the period of time for which it is decelerating.

(a) Sketch a speed-time graph to illustrate the motion of the particle.

Given that the total distance travelled by the particle is 480m,

(b) Find the total time for which the particle is moving,

(c) Sketch an acceleration-time graph illustrating the motion of the particle.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

9

- (a) A particle is moving along a straight line. It passes point  $B$ , 3 seconds after passing point  $A$ , and it passes point  $C$ , 5 seconds after passing point  $B$ . If  $AC$  is 80 m and the velocity of the particle at  $A$  is  $5 \text{ m s}^{-1}$  find the acceleration, assumed constant of the particle and the distance  $AB$ .
- (b) A particle is moving along a straight line with constant acceleration. It passes through points  $A$ ,  $B$  and  $C$ . It takes 2 secs to travel from  $A$  to  $B$ , a distance of 14 m, and it takes 3 secs to travel from  $B$  to  $C$ , a distance of 36m. Find the acceleration of the particle, and the speed as it passes through point  $A$ .
- (c) A person on top of a tower of height 40m holds their arm over the side and throws a stone of mass 200g vertically **upwards** with a speed of  $15\text{ms}^{-1}$ . Find the time taken for the stone to reach the ground and the speed of the stone as it hits the ground

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

10

Andrew hits a tennis ball vertically upwards towards his sister Barbara who is leaning out of a window 7.5 m above the ground to try to catch it. When the ball leaves Andrew's racket, it is 1.9 m above the ground and travelling at  $21 \text{ m s}^{-1}$ . Barbara fails to catch the ball on its way up but succeeds as the ball comes back down.

Modelling the ball as a particle and assuming that air resistance can be neglected,

- (a) find the maximum height above the ground which the ball reaches.
  
- (b) find how long Barbara has to wait from the moment that the ball first passes her until she catches it.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

11

20 endangered forest owlets were caught for ringing. Their wingspans ( $x$  cm) were measured to the nearest centimetre.

The following summary statistics were worked out:

$$\sum x = 316 \qquad \sum x^2 = 5078$$

(a) Work out the mean and the standard deviation of the wingspans of the 20 birds.

One more bird was caught. It had a wingspan of 13 centimetres.

(b) Without doing any further calculation, say how you think this extra wingspan will affect the mean wingspan.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

11

20 giant ibises were also caught for ringing. Their wingspans ( $y$  cm) were also measured to the nearest centimetre and the data coded using  $z = \frac{y-5}{10}$ .

The following summary statistics were obtained from the coded data:

$$\sum z = 104 \quad S_{zz} = 1.8$$

(c) Work out the mean and standard deviation of the wingspans of the giant ibis.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

12

(a) Given that  $y = 2^x$  show that

$$2^{2x+1} - 17(2^x) + 8 = 0$$

can be written in the form  $2y^2 - 17y + 8 = 0$

(b) Hence solve  $2^{2x+1} - 17(2^x) + 8 = 0$

TAP FOR ANSWERS

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

13

Express as a single fraction in its simplest form

$$\frac{x^2 - 8x + 15}{x^2 - 9} \times \frac{2x^2 + 6x}{(x - 5)^2} .$$

Remember **Factorise First**.

TAP FOR ANSWERS

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

14

Prove the following statements:

- (a) The sum of two odd numbers is an even number
- (b) The product of an odd and an even number is an even number
- (c) The product of two even numbers is even

*Note: Remember that 'prove' is a very strong word, you have to give a full, well explained, rigorous argument.*

TAP FOR ANSWERS



# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

15

The table shows the Daily Maximum Gust in Camborne in September 1987

- a) Calculate  $Q1$ ,  $Q2$  and  $Q3$
- b) Use the formula  $Q1 - 1.5 \times IQR$  and  $Q3 + 1.5 \times IQR$  to determine whether or not there are any outliers.
- c) Draw a box plot for this data.
- d) Where is Camborne?

Date	1-Sep	2-Sep	3-Sep	4-Sep	5-Sep	6-Sep	7-Sep	8-Sep	9-Sep	10-Sep
Max Gust	n/a	21	27	30	78	35	n/a	n/a	29	24
Date	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
Max Gust	33	26	26	25	17	26	13	n/a	25	30
Date	11-Sep	12-Sep	13-Sep	14-Sep	15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep
Max Gust	46	38	n/a	25	20	22	23	19	31	21

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 1 - Answers

(a)  $\frac{31}{61}$

(b)  $\frac{35}{78}$

(c)  $\frac{14}{23}$

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

2 - Answers

Proof

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 3 - Answers

a)  $Q_2 \approx 7.09$

(b)  $\bar{x} \approx 7.06$

TAP TO RETURN

**BHAVIC MATHS**  
**A1 DOUBLES ASSIGNMENT 2B**

4 - Answers

$d=0.71$

TAP TO RETURN

# **BHASVIC MαTHS**

## **A1 DOUBLES ASSIGNMENT 2B**

### 5 - Answers

Please use information from textbook/ google etc

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 6 - Answers

(a)  $4+5+6=15$

(b)  $2+2+2+2=8$

(c)  $1^2 + 2^2 + 3^2 + 4^2 = 30$

(d)  $3+6+11+18=38$

(e)  $\sum_{r=1}^4 (r^2 + 2) = \sum_{r=1}^4 r^2 + \sum_{r=1}^4 2$

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

7 - Answers

$$\bar{x} = 5.44$$

$$\sigma = 2.35$$

TAP TO RETURN



**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

8 - Answers

(b) 60 seconds

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 9 - Answers

(a)  $a = 1.25\text{ms}^{-2}$  AB = 20.6m

(b)  $a = 2\text{ms}^{-2}$   $v = 5\text{ms}^{-1}$

(c)  $t = 4.8\text{s}$   $v = 32\text{ms}^{-1}$

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 10 - Answers

(a) 24m

(b) 3.7 seconds

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

11 - Answers

- (a) Mean 15.8 cm, standard deviation 2.06 cm
- (b) The mean wingspan will decrease.
- (c) Mean 57 cm, standard deviation 3 cm.

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

12 - Answers

(b) -1,3

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 13 - Answers

$$\frac{2x}{x-5}$$

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 2B**

14 - Answers

Proof

TAP TO RETURN

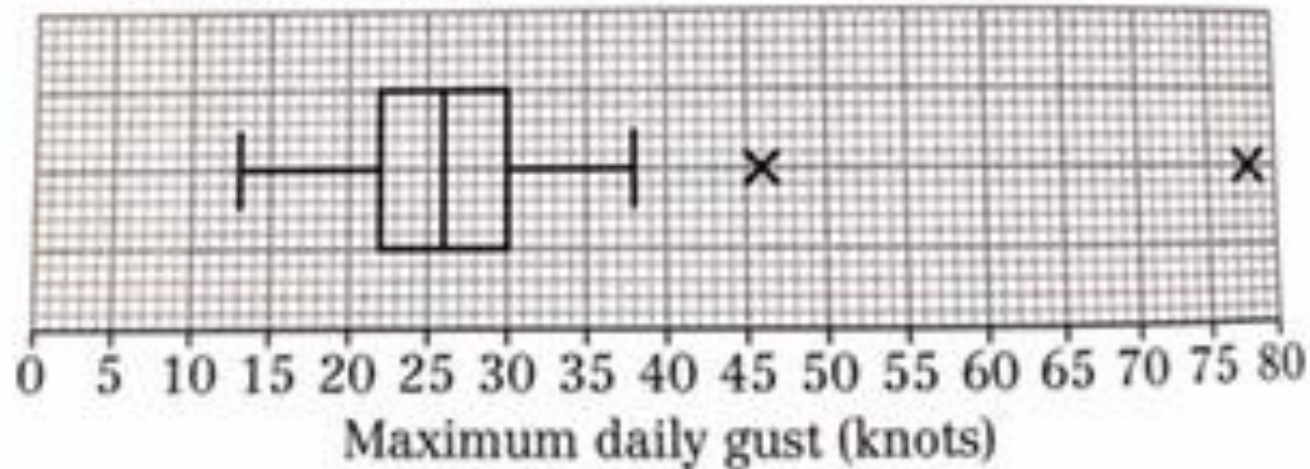
# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 2B

### 15 - Answers

a)  $Q1=22$ ,  $Q2=26$ ,  $Q3=30$     b) 46 and 78

c) Maximum daily gust in Camborne, September 1987



d) In Cornwall, in the south-west of England