

1. [Maximum mark 16]

The table below shows the ages of people on a flight from London to Bangkok.

<i>Ages</i>	<i>Frequency</i>
$0 \leq x < 20$	28
$20 \leq x < 40$	36
$40 \leq x < 50$	20
$50 \leq x < 70$	32
$70 \leq x < 100$	18

- i) a) Calculate an estimate of the mean age of people on a flight from London to Bangkok. [3 marks]
- b) State the group in which the medium numbers occurs. [1 mark]
- c) State the modal group. [1 mark]
- ii) a) Explain why the frequency density of the first class is 1.4. [1 mark]
- b) Using a scale of 1 cm = 10 years on the x -axis and an area scale of $1 \text{ cm}^2 = 2$ passengers draw a histogram to represent the information in the table. [6 marks]
- iii) A passenger is chosen at random. Find the probability that the passenger is,
- a) under 20 years old,
- b) over 40 years old,
- c) Over 70, given that the passenger is 20 or over. [4 marks]

2. [Maximum mark 18]

i) Consider the function $f(x) = x^3 + \frac{13}{2}x^2 - 10x + 4$.

a) Find $f'(x)$. [3 marks]

b) Find the x -coordinate of the maximum and minimum points of the function and distinguish between them. [7 marks]

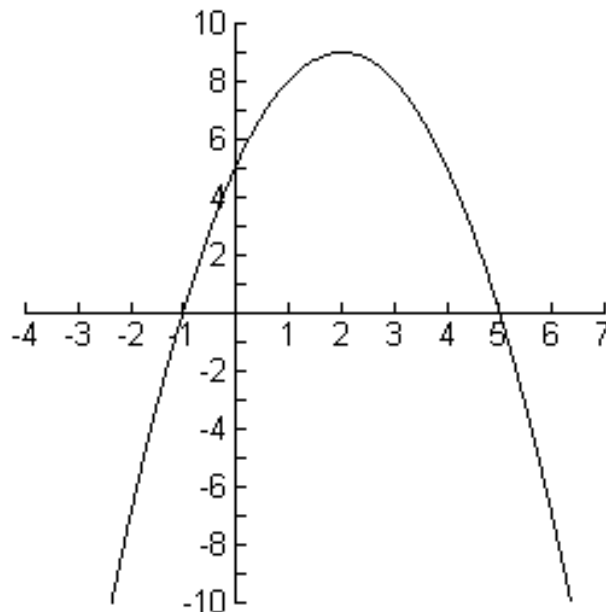
ii) Factorise,

a) $x^2 - 13x + 40$

b) $6 - x - x^2$

c) $3x^2 + 10x - 8$ [5 marks]

iii) Find the equation of the curve drawn below in the form,
 $y = ax^2 + bx + c$.



[3 marks]

3. [Maximum mark 20]

i) The set U is the set of numbers from 21 to 40 inclusive.

A , B , and C are subsets of U such that:

A contains all the prime numbers.

B contains all the multiples of 5.

C contains all the multiples of 7.

a) Explain why $B \cup C$ is mutually exclusive with set A .
[2 marks]

b) Write down the members of $B \cap C$. [2 marks]

c) Write down the members of $B \cup C$. [2 marks]

d) Find the probability of a number between chosen at random being a member of $B \cup C$. [2 marks]

e) Given that the number is a member of $B \cup C$, find the probability of the number being a member of $B \cap C$.
[2 marks]

ii) A bag contains 5 red balls and 3 blue balls. Two balls are chosen at random and a tree diagram is drawn to illustrate all the possibilities and probabilities.

a) Draw a tree diagram to illustrate the probabilities.
[4 marks]

b) Find the probability that both the balls are the same colour
[2 marks]

c) If 5 balls are chosen in a row (at random), find the probability of choosing 5 red balls. [4 marks]

4. [Maximum mark 20]

- i) A local cricket club keeps a record of the number of runs their star batsman, Izzy Wacket scores, and the number of runs the team scores during 10 matches in a season.

Match	Runs Izzy scores (x)	Runs the team scores (y)
1	52	201
2	65	180
3	13	270
4	120	320
5	105	295
6	24	260
7	48	195
8	140	402
9	20	84
10	76	306

- a) Calculate the mean number of runs Izzy scores over the 10 matches (\bar{x}). [1 mark]
- b) Calculate the mean number of runs the team scores over the 10 matches (\bar{y}). [1 mark]
- c) (i) Find the standard deviation of the Izzy's runs (S_x)
- (ii) Given that $S_{xy} = 2550$, find the equation of the line of regression y on x .
- (iii) In the 11th match Izzy scores 90 runs. Use your regression line to make an estimate of how many runs you would expect the team to score. [7 marks]
- d) One match has caused the gradient to become smaller than it perhaps should be. Which match do you think this is?

Explain what affect this will this have on your answers to part c).

[3 marks]

- ii) A survey into the votes of 400 men and 400 women was carried out Ohio and the results have been shown below.

	Democrat	Republican
Women	250	150
Men	220	180

- a) It is assumed that the vote cast is independent of gender. To prove this a χ^2 is to be conducted. The first part is a table of expected values drawn below.

	Democrat	Republican
Women	<i>a</i>	<i>b</i>
Men	<i>c</i>	165

Find the values of *a*, *b*, and *c* that are missing in the table above. *[3 marks]*

- b) Calculate the χ^2 test statistic. *[2 marks]*
- c) Are the votes cast independent of gender at the 5% level of significance?

Give a reason to justify your answer. *[3 marks]*

5. *[Maximum mark 16]*

- i) Zadie has a savings account that her parents add to on each birthday. On her first birthday they deposit \$1200, her second \$1800, her third \$2400, on so on.
- a) Calculate how much her parents deposit on her 18th birthday. *[3 marks]*
- b) Find the sum of money in the account on Zadie's 19th birthday, if her parents make the final payment on this birthday. *[3 marks]*
- ii) Abigail has a savings account that her parents add to each month. They start it on her first birthday with \$1000 and add 10% each year.
- a) Calculate the amount Abigail's parents will deposit on her 18th birthday. *[3 marks]*
- b) Calculate the total amount of savings Abigail will have on her 19th birthday, assuming that the last payment is made on her 19th birthday. *[5 marks]*
- iii) The first three terms of an arithmetic sequence are 10, 13.5, and 17.
- a) Find the 65th term. *[1 marks]*
- b) Calculate the sum of the 10th to the 20th terms inclusive. *[3 marks]*

Paper D

IB Studies Paper 2 Practice Tests

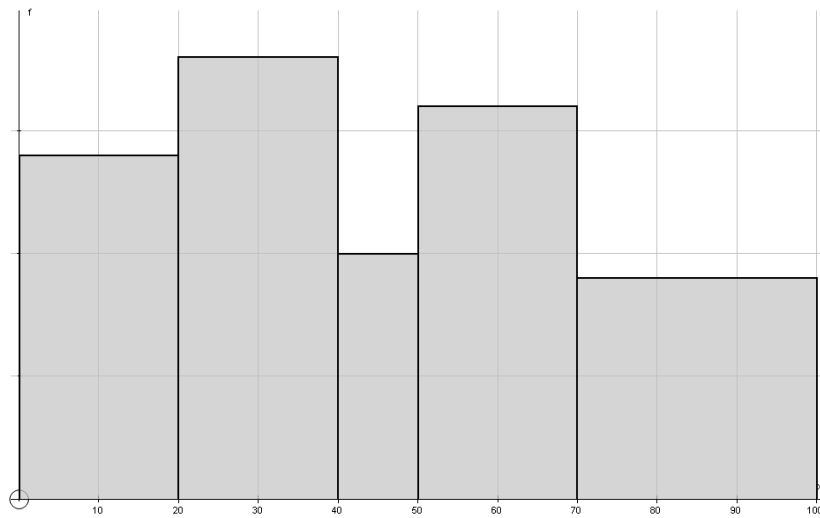
1. i) a) 42.6

b) 40 - 50

c) 20 - 40

ii) a) $28 \div 20$

b)



iii) a) $\frac{28}{134} = \frac{14}{67}$

b) $\frac{70}{134} = \frac{35}{67}$

c) $\frac{18}{106} = \frac{9}{53}$

2. i) a) $f'(x) = 3x^2 + 13x - 10$

b) Max = $x = -5$

Min = $x = \frac{2}{3}$

Paper D

IB Studies Paper 2 Practice Tests

ii) a) $(x - 5)(x - 8)$

b) $(x + 3)(x - 2)$

c) $(x + 4)(3x - 2)$

iii) $y = x^2 - 4x - 5$

3. i) a) A number cannot be prime and have factor of 5 or 7, unless the number is 5 or 7, these are not included in the universal set.

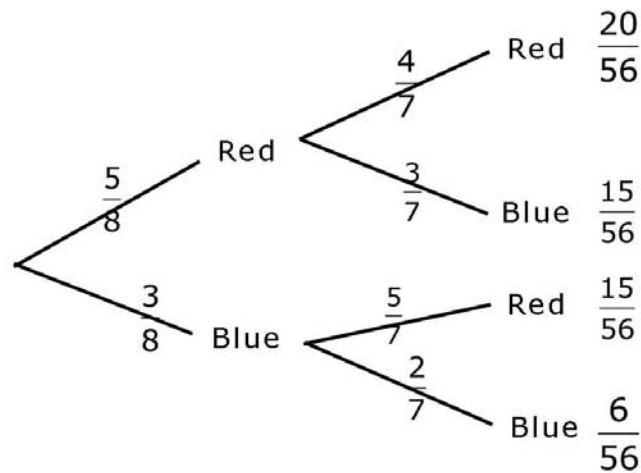
b) 35

c) 21, 25, 28, 30, 35, 40

d) $\frac{6}{20} = \frac{3}{10}$

e) $\frac{1}{6}$

ii) a)



Paper D

IB Studies Paper 2 Practice Tests

b) $\frac{26}{56} = \frac{13}{28}$

c) $\frac{120}{6720} = \frac{1}{56}$

4. i) a) $\bar{x} = 66.3$

b) $\bar{y} = 251.3$

c) (i) 41.5

(ii) $y = 1.48x + 153.1$

(iii) 286

(iv) Match 3 affects the results. Eliminating match 3, would cause the answer to (iii) to be greater.

ii) a) $a = 235$
 $b = 165$
 $c = 235$

b) 4.64

c) The voting is significant, that is the gender is not independent of the vote cast.

5. i) a) \$11400

b) \$125400

ii) a) \$5034

b) \$50159

iii) a) 234

b) 649