QUESTION 7 (75 MARKS)
Question 7 (a)

(i) The population is divided into different subgroups which have common characteristics. Random samples are drawn from each subgroup according to their proportion of the population.

(ii) Long haul economy class passengers.
Long haul business class passengers.
Long haul executive class passengers.
Short haul passengers.

MARKING SCHEME NOTES

Question 7 (a) (i) [Scale 5B (0, 3, 5)]

3:
• Reference to subgroups
• Reference to sampling
• Definition of random sample

Question 7 (a) (ii) [Scale 5B (0, 3, 5)]

3:
• Not clearly disjoint groups
• Incomplete number of groups (at least two)

Question 7 (b) (i)

Was flight delayed?	Yes	No	Don't Know
	231	748	21

$$P(\text{His/her flight delayed}) = \frac{231}{1000} = 0 \cdot 231$$

Passenger satisfaction with overall service	Satisfied	Not satisfied	Don't Know
	664	**238**	98

$$P(\text{Was not satisfied with the overall service}) = \frac{238}{1000} = 0 \cdot 238$$

Question 7 (b) (ii)

ANSWER: No

If it was, this would imply that the events were independent but this is not likely since a passenger who had his flight delayed is likely to be not satisfied with the service.

> MARKING SCHEME NOTES
> **Question 7 (b) (i) [Scale 5B (0, 3, 5)]**
> 3:   • One correct probability
>   • Some evidence of relevant understanding
>   NOTE: Accept any other answer in the range [0·231, 0·252], provided a suitable rationale is given
>
> **Question 7 (b) (ii) [Scale 5B (0, 3, 5)]**
> 3:   • Correct answer without explanation
>   • Correct answer with incorrect or incomplete explanation

Question 7 (c)

ANSWER: Graph **(ii)**

A lot of the passengers are likely to have baggage with a weight of less than the maximum 20 kg.
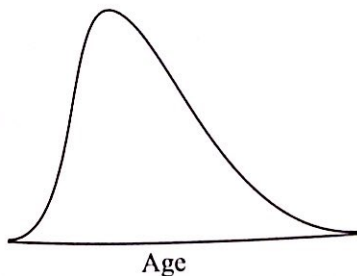
> MARKING SCHEME NOTES
> **Question 7 (c) [Scale 5B (0, 3, 5)]**
> 3:   • Correct answer without explanation
>   • Correct explanation but omits to nominate correct graph

Question 7 (d)

(i)

Age

(ii)   The median is less than the mean so the graph is skewed to the right.

Marking Scheme Notes
Question 7 (d) (i) [Scale 5B (0, 3, 5)]
3: • A partially correct bell shape curve

Question 7 (d) (ii) [Scale 5B (0, 3, 5)]
3: • Mention of mean and median but interpretation not related to candidate's curve

Question 7 (e) (i)

Null hypothesis H_0: Satisfaction level is unchanged, $P = 0.7$

95% margin of error of a sample of 1000: $\dfrac{1}{\sqrt{1000}} = 0.0316$

Passenger satisfaction with overall service	Satisfied	Not satisfied	Don't Know
	664	238	98

Recorded satisfaction level for May: $P = 0.664$

95% confidence interval for the population proportion:
$[0.664 - 0.0316, 0.664 + 0.0316] = [0.6324, 0.6956]$
There is evidence to refute the company's claims that 70% of their customers are satisfied with their overall service because, based on the sample data, any values in the range 63·24% and 69·56% are possible values for the proportion of passengers who are satisfied with the service.
Therefore, reject the null hypothesis as 0·7 lies outside this interval.

Question 7 (e) (ii)

Answer: No

$\dfrac{1}{\sqrt{1000}} = 0.0316$

$\dfrac{1}{\sqrt{2000}} = 0.02236$

$\tfrac{1}{2}(0.0316) = 0.0158 \neq 0.02236$

Important Note
This approach to finding the confidence interval is no longer used at Higher Level.

Marking Scheme Notes
Question 7 (e) (i) [Scale 10D (0, 3, 7, 9, 10)]
3: • One relevant step e.g. null hypothesis stated only
    • Some work towards margin of error
7: • Substantive work with one or more critical omissions
    • Margin of error and range found but fails to continue
9: • Failure to state null hypothesis correctly
    • Failure to cotextualise answer (e.g. stops at 'Reject null hypothesis')
    Note: Accept candidate work based on disregarding *don't knows*, yielding an observed satisfaction rating of 664/902 and a corresponding $n = 902$.
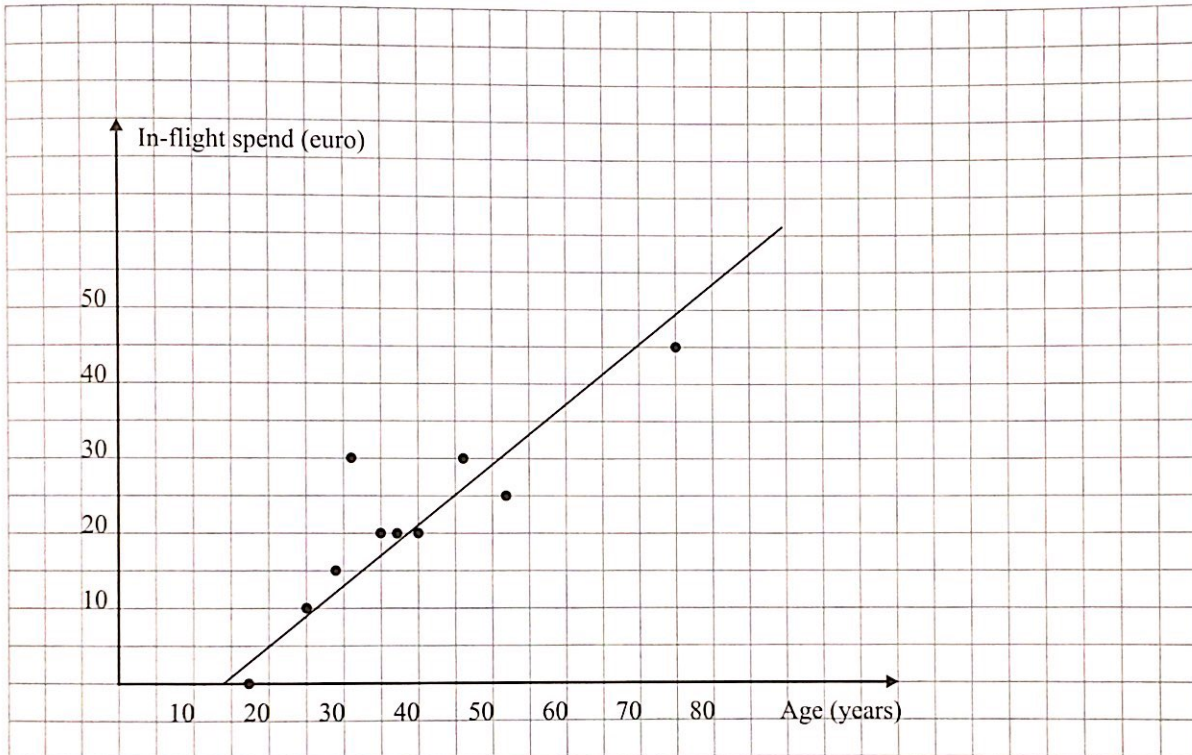
Question 7 (e) (ii) [Scale 5B (0, 3, 5)]
3: • Correct answer but no explanation
    • Partially correct explanation

Question 7 (f)

(i)/(iv)

(ii)

Casio Calculator (*fx-85GT PLUS*)	
Steps to find *r*:	Press AC Button
Press Mode.	Press Shift followed by the Number 1
Press 2: Stat	Press 5: Reg
Press 2: $A + Bx$	Press 3: *r*
Input your *x* and *y* values	Press =

Answer: $r = 0 \cdot 8822$

(iii) Older passengers tend to spend more. There is a strong correlation between the age of a passenger and the amount they spend.

Marking Scheme Notes

Question 7 (f) (i) [Scale 10C (0, 3, 8, 10)]

3: • Correct scale with at least two points plotted

8: • Correct scales but not all points plotted (one or two omissions)
• All points plotted but scales incorrect

Question 7 (f) (ii) [Scale 5A (0, 5)]

Question 7 (f) (iii) [Scale 5B (0, 3, 5)]

3: • Partially correct answer e.g. not in context
• Positive or strong positive correlation and stops

Question 7 (f) (iv) [Scale 5B (0, 3, 5)]

3: • Straight line but clearly not best fit

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