



eClassroom

INTERNATIONAL A LEVEL MATHEMATICS • STATISTICS 1

Statistics 1

Exam Questions by Topic: Mark Scheme

Pearson Edexcel International Advanced Level (WST01/01) • Calculator and Statistical Tables allowed

Every question in the booklet, marked line by line the way an examiner marks it

Chapters (tap a chapter to jump to it)	Qs	Marks	Page	My score
1 Mathematical Modelling Not examined on its own: modelling ideas are tested within Chapters 2 to 7	—	—	Not applicable	
2 Measures of Location and Spread Averages, quartiles, interpolation, standard deviation, coding	10	83	own PDF	
3 Representations of Data Histograms, stem and leaf, box plots, outliers, skewness, comparisons	10	80	own PDF	
4 Probability Venn and tree diagrams, conditional probability, independence	10	80	own PDF	
5 Correlation and Regression PMCC, least squares regression, interpretation, coding	10	84	own PDF	
6 Discrete Random Variables Probability and cumulative distributions, $E(X)$, $\text{Var}(X)$, uniform	10	82	3	
7 The Normal Distribution Standardising, tables, finding μ and σ , conditional problems	10	83	own PDF	

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How to use this mark scheme

The same marking rules Pearson examiners use for WST01.

Mark every line, not just the answer. Method marks are given for a correct method even when the final answer is wrong. If you lost marks, find the *first* line where your working differs from the scheme. That is the thing to fix.

Code	Meaning
M1	Method mark: for knowing a correct method and attempting to apply it. Small slips in the working do not lose this mark.
dM1	Dependent method mark: can only be given if the method mark before it has been given.
A1	Accuracy mark: for a correct answer or line of working. It can only be given if the method mark it depends on has been given.
B1	Independent mark: for a correct result or statement, whatever method was used.
*	The answer is given in the question. Every step must be shown, and the answer must follow from correct working (cso).
cao	Correct answer only.
cso	Correct solution only: no errors anywhere in the working.
ft	Follow through: the mark can be given for correct work using your own earlier (wrong) answer.
oe	Or equivalent: any correct equivalent form is accepted.

“Solutions relying on calculator technology are not acceptable.” When a question says this, a correct final answer with no algebraic working scores **no marks**. The notes under each scheme line say when this applies.



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Chapter 6: Discrete Random Variables

Mark scheme. Marks are shown on the right of each line.

Question 1

5 marks

Part	Scheme	Marks
(a)	$k(2 + 3 + 4 + 5) = 1$ $14k = 1$, so $k = \frac{1}{14}$ *	M1 A1* (2)
(b)	$\frac{1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5}{14}$ $\frac{20}{7}$	M1 A1 (2)
(c)	$\frac{4+5}{14} = \frac{9}{14}$	B1 (1)
Total for Question 1: 5 marks		

Question 2

5 marks

Part	Scheme	Marks
(a)	$a + b = 0.6$ (probabilities add to 1) $0.1 + 2a + 0.9 + 4b = 2.9$, i.e. $2a + 4b = 1.9$	B1 B1 (2)
(b)	Solves simultaneously $a = 0.25, b = 0.35$	M1 A1 (2)
(c)	$a + 0.3 = \frac{9}{14}$	B1ft (1)
Total for Question 2: 5 marks		



Question 3

5 marks

Part	Scheme	Marks
(a)	Differences of consecutive values of F $0.15, 0.2, 0.25, 0.25, 0.15$ for $x = 1, \dots, 5$	M1 A1 (2)
(b)	0.35	B1 (1)
(c)	$P(2 \leq X \leq 4) = F(4) - F(1)$ 0.7	M1 A1 (2)
Total for Question 3: 5 marks		

Question 4

5 marks

Part	Scheme	Marks
(a)	$5 - 2 \times 2.4 = 0.2$	B1 (1)
(b)	$(-2)^2 \times 1.3$ 5.2 <i>The 5 does not affect the variance, and -2 is squared: -5.2 or 2.6 scores M0 A0.</i>	M1 A1 (2)
(c)	$E(X^2) = \text{Var}(X) + [E(X)]^2 = 1.3 + 2.4^2$ 7.06	M1 A1 (2)
Total for Question 4: 5 marks		



Question 5

5 marks

Part	Scheme	Marks
(a)	Discrete uniform: $E(X) = \frac{13}{2} = 6.5$ and $\text{Var}(X) = \frac{12^2 - 1}{12} = \frac{143}{12}$ $6.5 \text{ and } 11.9$ (11.916...)	B1 B1 (2)
(b)	$E(Y) = 4 \times 6.5 - 3 = 23$ $\text{Var}(Y) = 16 \times \frac{143}{12} = 190.7$ ($\frac{572}{3}$)	B1 B1 (2)
(c)	$4X - 3 > 30 \Rightarrow X > 8.25$, so $X = 9, \dots, 12$: $\frac{1}{3}$	B1 (1)
Total for Question 5: 5 marks		

Question 6

12 marks

Part	Scheme	Marks
(a)	$a = 0.2$ $c = 0.55$ $b = 0.3$	B1 B1 B1 (3)
(b)	$0.1 + 0.4 + 0.75 + 1.2 + 0.75$ 3.2	M1 A1 (2)
(c)	$E(X^2) = 0.1 + 0.8 + 2.25 + 4.8 + 3.75 = 11.7$ 11.7 correct $\text{Var}(X) = 11.7 - 3.2^2 = 1.46$ *	M1 A1 A1* (3)
(d)	$E(Y^2) = \text{Var}(Y) + [E(Y)]^2 = 9 \times 1.46 + 8.6^2$ (or $E(9X^2 - 6X + 1)$) 87.1	M1 A1 (2)
(e)	$P(\text{odd}) = 0.1 + 0.25 + 0.15 = 0.5$ $0.5^2 = 0.25$	M1 A1 (2)
Total for Question 6: 12 marks		



Question 7

12 marks

Part	Scheme	Marks
(a)	Pairs (R, B) : $(1, 2), (2, 2), (3, 2), (1, 4)$ $\frac{4}{16} = \frac{1}{4}$	M1 A1 (2)
(b)	$R = 1: B = 2, 4, 6, 8; R = 2: B = 6, 8; R = 3, 4$: none 6 outcomes out of 16 $\frac{3}{8}$	M1 A1 A1 (3)
(c)	$F(1) = \frac{5}{16}$ $F(4) = \frac{3}{4}$	B1 B1 (2)
(d)	Probabilities $\frac{2}{16}, \frac{3}{16}, \frac{3}{16}, \frac{2}{16}, \frac{2}{16}, \frac{2}{16}, \frac{1}{16}, \frac{1}{16}$ for $d = 0, \dots, 7$ $\frac{0+3+6+6+8+10+6+7}{16}$ $\frac{23}{8}$	M1 M1 A1 (3)
(e)	The four outcomes in (a) have $D = 1, 0, 1, 3$ $\frac{3}{4}$	M1 A1 (2)
Total for Question 7: 12 marks		



Question 8

11 marks

Part	Scheme	Marks
(a)	$2p + 0.5 = 1$: $p = 0.25$	B1 (1)
(b)	$E(X) = 0.25 + 1 + 0.75 = 2$ * $E(X^2) = 0.25 + 2 + 2.25 = 4.5$ 4.5 correct $\text{Var}(X) = 4.5 - 2^2 = 0.5$ *	B1* M1 A1 A1* (4)
(c)	$E(Y) = 3$ $\frac{5^2 - 1}{12} = 2$	B1 B1 (2)
(d)	$\text{Var}(W) = a^2 \times 0.5 = 2$ $a = 2$ (as $a > 0$) $E(W) = 2 \times 2 + b = 3$ $b = -1$	M1 A1 M1 A1 (4)
Total for Question 8: 11 marks		



Question 9

10 marks

Part	Scheme	Marks
(a)	$E(X) = 0.5 + 0.6 = 1.1$ $E(X^2) = 0.5 + 9 \times 0.2 = 2.3$ $\text{Var}(X) = 2.3 - 1.1^2$ 1.09	B1 M1 M1 A1 (4)
(b)	He needs at least 3 points from 2 rounds: at least one round scoring 3 $1 - 0.8^2$ 0.36 <i>Listing: (3, any) or (0 or 1, 3): $0.2 + 0.8 \times 0.2 = 0.36$. Scores of 1 and 1 give only 2 points.</i>	M1 M1 A1 (3)
(c)	$P(3 \text{ and } 3) = 0.2^2 = 0.04$ $\frac{0.04}{0.36}$ $\frac{1}{9}$	B1 M1 A1 (3)
Total for Question 9: 10 marks		



Question 10

12 marks

Part	Scheme	Marks
(a)	$F(4) = 1: (4+k)^2 = 36$ $4+k = 6$ (as $k > 0$), so $k = 2$ *	M1 A1* (2)
(b)	$F(1) = \frac{9}{36}, F(2) = \frac{16}{36}, F(3) = \frac{25}{36}$ and uses differences At least two correct $\frac{9}{36}, \frac{7}{36}, \frac{9}{36}, \frac{11}{36}$ for $x = 1, 2, 3, 4$	M1 A1 A1 (3)
(c)	$\frac{9+14+27+44}{36}$ $\frac{47}{18}$	M1 A1 (2)
(d)	$2X > 7$, so $X > 3.5$, i.e. $X = 4$ $\frac{11}{36}$	M1 A1 (2)
(e)	$E(X^2) = \frac{9+28+81+176}{36} = \frac{49}{6}$ $\text{Var}(X) = \frac{49}{6} - \left(\frac{47}{18}\right)^2 = 1.348\dots$ $9 \times 1.348\dots = 12.1$	M1 M1 A1 (3)
Total for Question 10: 12 marks		

