Probability Distribution – Edexcel Past Exam Questions MARK SCHEME

Question 1: Jan 05 Q4

Question Number	Scheme	Marks
(a)	$k + 2k + 3k + 4k + 5k = 1$ $15k = 1$ $** \ k = \dfrac{1}{15} **$	$\sum P(X = x) = 1$ **M1** cso **A1** (2)
(b)	$P(X < 4) = P(1) + P(2) + P(3) \quad = \dfrac{1}{15} + \dfrac{2}{15} + \dfrac{3}{15}$ $= \dfrac{2}{5}$	sum of 3 probabilities **M1** $\dfrac{6}{15}$ or $\dfrac{2}{5}$ **A1** (2)

Question 2: June 05 Q5

(a)	$k + 2k + 3k + 5k + 6k = 1$ $17k = 1$ $k = \dfrac{1}{17} = 0.0588$	use of $\sum P(X = x) = 1$	M1 A1 (2)

Question 3: Jan 07 Q3

Question number	Scheme	Marks
(a)	N.B. Part (a) doesn't have to be in a table, could be a list $P(X = 1) = \ldots$etc	B1, B1, B1

x	1	2	3	4	5	6
$P(X = x)$	$\dfrac{1}{36}$	$\dfrac{3}{36}$	$\dfrac{5}{36}$	$\dfrac{7}{36}$	$\dfrac{9}{36}$	$\dfrac{11}{36}$

0.0278, 0.0833, 0.139, 0.194, 0.25, 0.306   (Accept awrt 3 s.f)   (3)

(b)	$P(3) + P(4) + P(5) =, \ \dfrac{21}{36}$ or $\dfrac{7}{12}$ or awrt 0.583	M1, A1 (2)

Question 4: June 07 Q7

Question Number	Scheme	Marks
(a)	$p = 0.30$	(1)
(b)	$P(4 < X < 7) = P(5) + P(7)$	M1
	$= 0.2 + q = 0.35$	A1 $\int$

Question 5: Jan 08 Q7

Question Number	Scheme		Marks
(a)	$P(R = 3 \cap B = 0) = \dfrac{1}{4} \times \dfrac{1}{4}, = \dfrac{1}{16}$		M1, A1
			(2)
(b)			

3	0	3	6	9
2	0	2	4	6
1	0	1	2	3
0	0	0	0	0
B R	0	1	2	3

All 0s   B1
All 1,2,3s   B1
All 4,6,9s   B1

(3)

Question 6: June 09 Q6

Question Number	Scheme	Marks
(a)	<table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>3a</td><td>2a</td><td>a</td><td>b</td></tr></table>	B1 (1)
(b)	$a = 0.1$ cao	B1
(c)	$P(0.5 < x < 3) = P(1) + P(2)$ 3a or their 2a+their a	M1
	$= 0.2 + 0.1$	
	$= 0.3$ Require $0<3a<1$ to award follow through	A1 ft (2)

Question 7: Jan 10 Q5

Question Number	Scheme	Marks
(a)	$k + 4k + 9k = 1$	M1
	$14k = 1$	
	$k = \dfrac{1}{14}$ **given** cso	A1 (2)
(b)	$P(X \geq 2) = 1 - P(X = 1)$ or $P(X = 2) + P(X = 3)$	M1
	$= 1 - k = \dfrac{13}{14}$ or 0.92857... awrt 0.929	A1 (2)

(a)	M1	for clear attempt to use $\sum p(x) = 1$, full expression needed and the "1" must be clearly seen. This may be seen in a table.
	A1cso	for no incorrect working seen. The sum and "= 1" must be explicitly seen somewhere.
		A verification approach to (a) must show addition for M1 and have a suitable comment e.g. "therefore $k = \frac{1}{14}$" for A1 cso
(b)	M1	for $1 - P(X \leq 1)$ or $P(X = 2) + P(X = 3)$
	A1	for awrt 0.929. Answer only scores 2/2

Question 8: June 10 Q3

Question Number	Scheme	Marks
(a)	$a = \dfrac{1}{4}$ or 0.25	A1 (1)
(b)	$X \geq Y$ when $X = 3$ or 2, so probability $= "\frac{1}{4}" + \frac{1}{5}$	M1 A1ft
	$= \frac{9}{20}$ oe	A1 (3)

Question 9: Jan 11 Q6

Question Number	Scheme	Marks
(a)	$k + 2k + 3k + 4k = 1$ or $10k = 1$ $k = 0.1$ (*) [allow verification with a comment e.g. "so $k = 0.1$"]	B1cso (1)
(b)	$P(1,3) + P(2,2) = 2 \times 0.1 \times 0.3 + 0.2 \times 0.2 = 0.1$ (*)	M1 A1cso (2)
(c)		B1 B1 (2)
(d)	$P(2) + P(3) = 0.05$	M1A1 (2) [14]

For (c):

$X_1 + X_2$	2	3	4	5	6	7	8
p	0.01	0.04	0.1	**0.2**	0.25	0.24	**0.16**

Question 10: June 11 Q3

Question Number	Scheme	Marks
(a)	$c = \underline{0.2}$	A1 (5)
(b)	$P(3Y + 2 \geq 8) = P(Y \geq 2)$ or $1 - P(Y \leq 1)$ $= b + 0.3 + c$ or $1 - a$ $= \underline{0.9}$	M1 A1ft (2) 7
Notes		
	Correct answers with no (or irrelevant) working score full marks	
(b)	M1 for rearranging to $P(Y \geq 2)$ or $1 - P(Y \leq 1)$ or selecting cases $Y = 2$, 3 and 4 A1ft for 0.3 + their b + their c or 1 - their a, provided final answer < 1 and their values are probabilities.	

Question 11: June 11 Q8

Question Number	Scheme	Marks
(a)	$1 = p + (0.25 + 0.25 + 0.2 + 0.2)$, $\Rightarrow p = \underline{\frac{1}{10} \text{ or } 0.1}$	M1, A1 (2)
(b)	$P(5 \text{ and } 5) = \left(\frac{1}{5}\right)^2$, $= \underline{\frac{1}{25} \text{ or } 0.04}$	M1, A1 (2)
(c)	$P(4, 4, 2) = \left(\frac{1}{5}\right)^2 \times \frac{1}{4} \times 3$ $(= 0.03 \text{ or } \frac{3}{100})$ $P(4, 4, 4) = \left(\frac{1}{5}\right)^3$ $(= 0.008 \text{ or } \frac{1}{125})$ $P(\text{Tom wins in 3 spins}) = \underline{0.038}$	M1, M1 B1 A1 (4)
(d)	$P(\overline{5} \cap 5 \cap 5) + P(5 \cap \overline{5} \cap 5) = \frac{4}{5} \times \left(\frac{1}{5}\right)^2 \times 2 = \underline{0.064 \text{ or } \frac{8}{125}}$	M1, M1, A1 (3) 17
Notes		
(b)	M1 for $\left(\frac{1}{5}\right)^2$ Condone $P(5) \times P(5) = 0.25 \times 0.25$. [Beware 0.4 is A0]	
(c)	1st M1 for $\left(\frac{1}{5}\right)^2 \times \frac{1}{4}$ or 0.01 seen 2nd M1 for multiplying a $p^2 q$ probability by $3(p, q \in (0,1))$. B1 for $(0.2)^3$ or better seen	
(d)	1st M1 for $\frac{4}{5} \times \left(\frac{1}{5}\right)^2$ or all cases considered and correct attempt at probabilities. 2nd M1 for multiplying a $p^2(1-p)$ probability by 2. **Beware $(0.4)^3 = 0.064$ is M0M0A0**	