Question Number	Scheme	Marks
2.(a)	[E(X) =] $(-2\times0.15)+(-1\times a)+0+(1\times a)+(3\times0.4)$ or $-0.3-a+a+1.2$	M1
	$=$ **0.9**	A1
		(2)
(b)	[E(X^2) =] $\{(-2)^2\times0.15\}+\{(-1)^2\times a\}+\{1^2\times a\}+\{3^2\times0.4\}$	M1
	or $0.6+2a+3.6$	
	So $4.2+2a=4.54$	dM1
	$a=$ **0.17**	A1
	Use of sum of probabilities = 1 e.g. $0.15+$ "0.34" $+0.4+b=1$	M1
	$b=$ **0.11**	A1
		(5)
(c)	[Var(X) =] $4.54-(\text{their } 0.9)^2$ [= 3.73]	M1
	Var(Y) = $(-2)^2$ Var(X)	M1
	= **14.92** (accept 14.9)	A1
		(3)
		[10 marks]

	Notes
	Correct answers with no working can score all the relevant marks.
(a)	M1 for an attempt at E(X) i.e. at least 3 non-zero correct products seen
	A1 for 0.9 or any exact equivalent
(b)	1st M1 for an attempt at an expression in a for E(X^2) (at least 3 non-zero correct products)
	2nd dM1 dependent on 1st M1 for using their E(X^2) and 4.54 to form a linear equation in a
	1st A1 for $a = 0.17$ or exact equivalent
	3rd M1 for use of sum of probabilities = 1 to form a linear equation for b (ft their $a \in [0,1]$)
	or for the equation $0.15 + 2a + b + 0.4 = 1$ or $2a + b = 0.45$
	2nd A1 for $b = 0.11$ or exact equivalent
(c)	1st M1 for a correct expression for Var(X) (ft their 0.9 for E(X))
	Allow expression based on working out E(X^2) and ft their E(X), their $a \in [0,1]$, their $b \in [0,1]$
	2nd M1 for $(-2)^2 \times$ (their Var(X)) condone e.g. -2^2Var(X) if it later becomes 4Var(X)
	This can be awarded for the formula with Var(X) not necessarily a value.
	If they state Var(X) = E(X^2) or 4.54 then M0M1 is possible.
	A1 for 14.92 (accept 14.9)
ALT	**Dist of Y**

y	7	5	3	1	-3
P($Y=y$)	0.15	a	b	a	0.4

1st M1 for E(Y) = 6 "a" + 3 "b" – 0.15 or 1.2 **and** E(Y^2) = 26 "a" + 9 "b" + 10.95 or 16.36

2nd M1 for Var(Y) = "16.36" – ["1.2"]^2 allow ft of their E(Y) $\neq$ their (a) and E(Y^2) $\neq 4.54$ but E(Y^2) > 0