6. A biased die with six faces is rolled. The discrete random variable X represents the score which is uppermost. The **cumulative** distribution function of X is shown in the table below.

x	1	2	3	4	5	6
F(x)	0.1	0.2	$3k$	$5k$	$7k$	$10k$

(a) Find the value of the constant k

(1)

(b) Find the probability distribution of X

(3)

A biased die with eight faces is rolled. The discrete random variable Y represents the score which is uppermost. The probability distribution of Y is shown in the table below, where a and b are constants.

y	1	2	3	4	5	6	7	8
P($Y = y$)	a	a	a	b	b	b	0.11	0.05

Given that $\mathrm{E}(Y) = 4.02$

(c) form and solve two equations in a and b to show that $a = 0.15$
You must show your working.

(*Solutions relying on calculator technology are not acceptable.*)

(3)

(d) Show that $\mathrm{E}(Y^2) = 20.7$

(2)

(e) Find $\mathrm{Var}(5 - 2Y)$

(3)

These dice are each rolled once. The scores on the two dice are independent.

(f) Find the probability that the sum of these two scores is 3

(2)

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Question 6 continued

(Total for Question 6 is 14 marks)

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