

# Pearson Edexcel AS Mathematics 8MA0

## Statistics – Statistical Distributions

Time allowed: 45 minutes

School: [www.CasperYC.club](http://www.CasperYC.club)

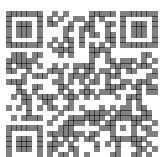
Name:

Teacher:

How I can achieve better:

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Question	Points	Score
1	5	
2	4	
3	8	
4	4	
5	6	
6	6	
7	5	
8	12	
Total:	50	



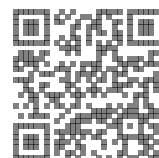
1. The discrete random variable  $X$  has probability function

$$\Pr(X = x) = \begin{cases} k(x^2 - 9), & x = 4, 5, 6 \\ 0, & \text{otherwise} \end{cases}$$

where  $k$  is a positive constant.

- (a) Show that  $k = \frac{1}{50}$ . [3]
- (b) Find the probability distribution of  $X$ . [2]

Total: 5



2. The discrete random variable  $X$  has probability function

$$\Pr(X = x) = \begin{cases} 0.15, & x = -3, -2 \\ \alpha, & x = -1, 0 \\ 0.1, & x = 1, 2 \\ 0, & \text{otherwise} \end{cases}$$

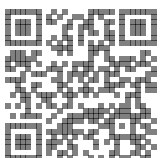
Find

(a)  $\alpha$  [2]

(b)  $\Pr(-1 \leq X < 2)$  [1]

(c)  $\Pr(X > -2.3)$  [1]

Total: 4



3. The discrete random variable  $X$  has probability function

$$\Pr(X = x) = \begin{cases} k(2 - x), & x = 0, 1, 2 \\ k(x - 2), & x = 3 \\ 0, & \text{otherwise} \end{cases}$$

where  $k$  is a positive constant.

(a) Show that  $k = 0.25$ . [2]

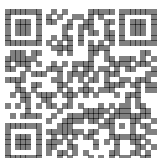
Two independent observations  $X_1$  and  $X_2$  are made of  $X$ .

(b) Show that  $\Pr(X_1 + X_2 = 5) = 0$ . [1]

(c) Find the complete probability function for  $X_1 + X_2$ . [3]

(d) Find  $\Pr(1.3 \leq X_1 + X_2 \leq 3.2)$ . [2]

Total: 8

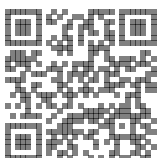


4. Amir and Ed play each other at badminton and for each game, independently of all others, the probability that Amir loses is 0.2. Find the probability that, in 9 games, Amir loses:

(a) exactly 3 of the games, [2]

(b) fewer than half of the games. [2]

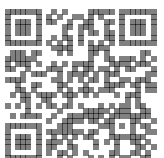
Total: 4



5. A manufacturer supplies MP3 players to retailers in batches of 20, which are randomly selected. Long-term analysis shows that 5% of the players are faulty.

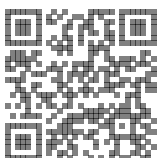
- (a) Write down a suitable model for the distribution of the number of faulty MP3 players in a batch giving the value(s) of any parameter(s). [2]
- (b) Find the probability that a batch contains no faulty MP3 players. [2]
- (c) Show that the probability of there being more than 4 faulty MP3 players in a batch is equal to 0.0026 to 2 significant figures. [2]

Total: 6



6. Emma throws a fair coin 15 times and records the number of times it shows a head.
- (a) State the appropriate distribution to model the number of times the coin shows a head [2]  
giving any relevant parameter values.
- (b) Find the probability that Emma records:
- i. exactly 8 heads, [2]
  - ii. at least 4 heads. [2]

Total: 6

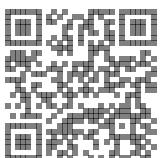


7. A manufacturer produces large quantities of coloured plates. It is known from previous records that 6% of the production will be blue.

A random sample of 10 plates was taken from the production line.

- (a) Give the name of a suitable distribution to model the number of blue plates in this sample and state why it is suitable. [2]
- (b) Find the probability that there were more than 2 blue plates in the sample. [3]

Total: 5



8. (a) Write down the conditions under which the binomial distribution may be a suitable model to use in statistical work. [4]

A six-sided die is biased. When the die is thrown the number 5 is twice as likely to appear as any other number. All the other faces are equally likely to appear. The die is rolled repeatedly.

- (b) Find the probability that:

- i. the first 5 will occur on the sixth throw [5]
- ii. in the first eight throws there will be exactly three 5s. [3]

Total: 12

