HIGHER

7.2 The Binomial Distribution: 1-hour Pack

EDEXCEL 1ST0 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A biased spinner has outcomes C, E, B, F, D. The probabilities are in the table; one value is missing.

Outcome	Probability
C	3/10
E	1/20
B	1/5
F	3/10
D	x

(a) Work out the value of x.

(b) The spinner is spun 100 times. Estimate how many times outcome D occurs.

(Total for Question 1 is 4 marks)

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2 A biased spinner has outcomes C, D, F, A, B, E. The probabilities are in the table; one value is missing.

Outcome	Probability
C	7/200
D	3/200
F	3/200
A	x
B	7/200
E	3/200

(a) Work out the value of x.
(b) The spinner is spun 1000 times. Estimate how many times outcome A occurs.

(Total for Question 2 is 4 marks)

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3 A bag contains 3 red, 2 pink, 6 yellow and 6 black beads. Sofia takes one at random.
(a) What is the probability that it is not red?
(b) What is the probability that it is red or pink?
(c) Sofia puts the object back and repeats this 340 times. How many times would you expect a red object to be taken?
Give probabilities as fractions in their simplest form.

(Total for Question 3 is 6 marks)

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4 In an experiment, 10 seeds are planted, each independently with germination probability 1/3. Let X be the number of seeds that germinate. X follows a binomial distribution. Work out P(X = 6). Give your answer to 3 significant figures.

(Total for Question 4 is 4 marks)

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5 A bag contains 4 yellow, 2 pink, 2 blue and 1 white beads. Mohammed takes one at random.

(a) What is the probability that it is not yellow?

(b) What is the probability that it is yellow or pink?

(c) Mohammed puts the object back and repeats this 180 times. How many times would you expect a yellow object to be taken?

Give probabilities as fractions in their simplest form.

(Total for Question 5 is 6 marks)

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6 A biased spinner has outcomes C, F, A, B, E. The probabilities are in the table; one value is missing.

Outcome	Probability
C	1/10
F	x
A	1/40
B	1/20
E	3/40

(a) Work out the value of x.

(b) The spinner is spun 200 times. Estimate how many times outcome F occurs.

(Total for Question 6 is 4 marks)

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7 A bag contains 2 blue, 5 white, 7 red and 5 yellow sweets. Tom takes one at random.

(a) What is the probability that it is blue?

(b) What is the probability that it is not blue?

Give probabilities as fractions in their simplest form.

(Total for Question 7 is 3 marks)

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8 A bag contains 8 blue, 2 green, 6 pink and 7 white beads. Quinn takes one at random.

(a) What is the probability that it is blue?

(b) What is the probability that it is not blue?

Give probabilities as fractions in their simplest form.

(Total for Question 8 is 3 marks)

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9 In an experiment, a fair coin is flipped 6 times. Let X be the number of heads. X follows a binomial distribution.

(a) Write down the values of n and p.

(b) Work out the mean number of heads, E(X) = np.

(Total for Question 9 is 4 marks)

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10 A bag contains 7 orange, 8 yellow and 2 blue beads. Grace takes one at random.

(a) What is the probability that it is not orange?

(b) What is the probability that it is orange or yellow?

(c) Grace puts the object back and repeats this 170 times. How many times would you expect a orange object to be taken?

Give probabilities as fractions in their simplest form.

(Total for Question 10 is 6 marks)

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11 A bag contains 2 pink, 3 orange, 4 blue and 6 red marbles. Sofia takes one at random.

(a) What is the probability that it is pink?

(b) What is the probability that it is not pink?

Give probabilities as fractions in their simplest form.

(Total for Question 11 is 3 marks)

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12 A bag contains 9 red, 9 white, 2 yellow and 1 green counters. Lucas takes one at random.

(a) What is the probability that it is not red?

(b) What is the probability that it is red or white?

(c) Lucas puts the object back and repeats this 140 times. How many times would you expect a red object to be taken?

Give probabilities as fractions in their simplest form.

(Total for Question 12 is 6 marks)

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13 A bag contains 9 yellow, 5 orange and 5 pink counters. Tom takes one at random.

(a) What is the probability that it is yellow?

(b) What is the probability that it is not yellow?

Give probabilities as fractions in their simplest form.

(Total for Question 13 is 3 marks)

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14 In an experiment, a fair coin is flipped 12 times. Let X be the number of heads. X follows a binomial distribution. Work out the probability that X is at least 1, $P(X \geq 1)$. Give your answer to 3 significant figures.

(Total for Question 14 is 3 marks)

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Mark scheme · 7.2 The Binomial Distribution: 1-hour Pack

Question 1

1 minus the sum of the other probabilities	**M1**
3/20 oe	**A1**
3/20 x 100	**M1**
15 cao	**A1**

Answer: (a) 3/20; (b) 15

Question 2

1 minus the sum of the other probabilities	**M1**
177/200 oe	**A1**
177/200 x 1000	**M1**
885 cao	**A1**

Answer: (a) 177/200; (b) 885

Question 3

1 - 3/17 or 14/17	**M1**
14/17 oe	**A1**
(3 + 2) / 17	**M1**
5/17 oe	**A1**
3/17 x 340	**M1**
60 cao	**A1**

Answer: (a) 14/17; (b) 5/17; (c) 60

Question 4

C(10,6) or 210 used	**M1**
$(1/3)^6 \times (2/3)^4$	**M1**
all three parts multiplied	**M1**
0.0569 cao	**A1**

Answer: 0.0569

Question 5

1 - 4/9 or 5/9	**M1**
5/9 oe	**A1**
(4 + 2) / 9	**M1**
2/3 oe	**A1**
4/9 x 180	**M1**
80 cao	**A1**

Answer: (a) 5/9; (b) 2/3; (c) 80

Question 6

1 minus the sum of the other probabilities	**M1**
3/4 oe	**A1**
3/4 x 200	**M1**
150 cao	**A1**

Answer: (a) 3/4; (b) 150

Question 7

2/19 oe	**B1**
1 - 2/19 or 17/19	**M1**
17/19 oe	**A1**

Answer: (a) 2/19; (b) 17/19

Question 8

8/23 oe	**B1**
1 - 8/23 or 15/23	**M1**
15/23 oe	**A1**

Answer: (a) 8/23; (b) 15/23

Question 9

n = 6	**B1**
p = 1/2	**B1**
6 x 1/2	**M1**
3 cao	**A1**

Answer: (a) n = 6, p = 1/2; (b) 3

Question 10

1 - 7/17 or 10/17	**M1**
10/17 oe	**A1**
(7 + 8) / 17	**M1**
15/17 oe	**A1**
7/17 x 170	**M1**
70 cao	**A1**

Answer: (a) 10/17; (b) 15/17; (c) 70

Question 11

2/15 oe	**B1**
1 - 2/15 or 13/15	**M1**
13/15 oe	**A1**

Answer: (a) 2/15; (b) 13/15

Question 12

1 - 3/7 or 12/21	**M1**
4/7 oe	**A1**
(9 + 9) / 21	**M1**
6/7 oe	**A1**
3/7 x 140	**M1**
60 cao	**A1**

Answer: (a) 4/7; (b) 6/7; (c) 60

Question 13

9/19 oe	**B1**
1 - 9/19 or 10/19	**M1**
10/19 oe	**A1**

Answer: (a) 9/19; (b) 10/19

Question 14

$P(X \geq 1) = 1 - P(X = 0)$	**M1**
$P(X = 0) = (1/2)^{12}$	**M1**
1.00 cao	**A1**

Answer: 1.00

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