FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... Class .....

P2: Expected outcomes and fairness

Solve problems involving expected outcomes, profit and fairness

20 marks · 25 minutes · Non-calculator

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1) A game costs £1. Two fair dice are rolled and a double wins £5. The game is played 360 times. How much profit should the organiser expect?

£ .....

[Question 1: 3 marks]

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2) A spinner pays £2 with probability 0.2, £5 with probability 0.05 and nothing otherwise. What should a spin cost so that the expected profit is 50p per spin?

£ .....

[Question 2: 3 marks]

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3) A coin is flipped and a dice is rolled. Ann wins if she gets a head and an even number; otherwise Ben wins. Ben scores 1 point for each win. How many points should Ann score for each win to make the game fair?

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[Question 3: 3 marks]

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4) A raffle sells 300 tickets at £2 each. There is one prize costing £150 and three prizes costing £50 each. How much profit is made?

£ .....

[Question 4: 2 marks]

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5) The probability that a person says "yes" in a survey is 0.62. 450 people are asked. How many "yes" answers would you expect?

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[Question 5: 2 marks]

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6) A bag has 4 red and 6 blue counters. A player pays £1.50, takes a counter at random, and wins £3 for red. The counter is replaced. How much should the organiser expect to make from 50 games?

£ .....

[Question 6: 3 marks]

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7) Two fair dice are rolled. A player wins a prize if the total is 10 or more. A game costs £1. What should the prize be for the game to be fair?

£ .....

[Question 7: 4 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	£60	$P(\text{double}) = \frac{1}{6}$ (P1); 60 wins, £300 paid (P1); A1.
2	£1.15	Expected payout 0.4 + 0.25 (P1, P1); 0.65 + 0.50 (A1).
3	3	$P(\text{Ann}) = \frac{1}{4}$ (P1); $\frac{1}{4}k = \frac{3}{4}$ (P1); A1.
4	£300	£600 income, £300 prizes (P1); A1.
5	279	0.62×450 (P1); A1.
6	£15	Expected payout £1.20 (P1); 30p per game (P1); A1.
7	£6	6 outcomes out of 36 (P1, P1); $\frac{1}{6}X = 1$ (P1); A1.