5.4 Experimental Probability and Relative Frequency: 1-hour Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A class of 24 students each flips a fair coin twice, giving 48 tosses in total. They observe 30 heads. Find the relative frequency of heads, the expected number of heads, and say how many more heads were observed than expected.

(3)

2 Lily spins a spinner 25 times and it lands on blue 22 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(1)

3 A die is rolled 120 times and a 6 appears 22 times. If the die is fair, a 6 should appear about 20 times. Does the data suggest that the die is biased? Give a reason.

(2)

4 The probability that a seed grows into a plant is 1/4. Sam plants 40 seeds. How many plants should he expect?

(2)

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5 Lily spins a spinner 200 times and it lands on blue 124 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(2)

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6 A die is rolled 600 times and a 6 appears 200 times. If the die is fair, a 6 should appear about 100 times. Does the data suggest that the die is biased? Give a reason.

(2)

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7 Lily spins a spinner 80 times and it lands on blue 54 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(2)

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8 A die is rolled 60 times and a 6 appears 9 times. If the die is fair, a 6 should appear about 10 times. Does the data suggest that the die is biased? Give a reason.

(2)

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9 Lily spins a spinner 100 times and it lands on blue 97 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(1)

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10 In an experiment a drawing pin is dropped 200 times and lands point up 34 times. Use this to estimate how many times it will land point up in 500 drops.

(3)

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11 A die is rolled 600 times and a 6 appears 102 times. If the die is fair, a 6 should appear about 100 times. Does the data suggest that the die is biased? Give a reason.

(2)

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12 Lily spins a spinner 20 times and it lands on blue 17 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(1)

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13 The probability that a seed grows into a plant is 3/4. Sam plants 60 seeds. How many plants should he expect?

(2)

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14 A student tosses a coin 50 times and gets 28 heads. Calculate the relative frequency of heads from this experiment.

(2)

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15 The probability that it rains on a given day is 7/20. Estimate the number of days with rain in a period of 40 days.

(2)

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16 A die is rolled 600 times and a 6 appears 100 times. If the die is fair, a 6 should appear about 100 times. Does the data suggest that the die is biased? Give a reason.

(2)

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17 The probability that it rains on a given day is 1/20. Estimate the number of days with rain in a period of 80 days.

(2)

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18 Lily spins a spinner 100 times and it lands on blue 36 times. Work out the relative frequency of blue. Give your answer as a fraction in its simplest form.

(2)

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19 A coin is thrown 50 times and lands on heads 20 times. Work out the relative frequency of heads as a decimal, and say whether this is close to 0.5.

(2)

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20 A die is rolled 60 times and a 6 appears 8 times. If the die is fair, a 6 should appear about 10 times. Does the data suggest that the die is biased? Give a reason.

(2)

21 A coin is tossed 25 times and lands on heads 14 times. Find the relative frequency of heads as a decimal.

(1)

22 A quality-control test is carried out 250 times on a machine, and the machine fails 15 times. Calculate the relative frequency of failure as a decimal, giving your answer to 3 decimal places.

(2)

23 A factory tests bulbs from two production lines. Line A: 500 bulbs tested, 15 defective. Line B: 400 bulbs tested, 16 defective.

(a) Find the relative frequency of a defective bulb for Line A and for Line B. **(2)**

(b) State, with a reason, which line has the higher defect rate. **(2)**

24 An event occurs 35 times out of 50 trials. Write down the relative frequency of the event as a percentage.

(1)

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Mark scheme · 5.4 Experimental Probability and Relative Frequency: 1-hour Pack

Question 1

relative frequency 30/48 or 0.625 shown	M1
expected number 1/2 of 48 = 24 shown	M1
experimental higher by 30 - 24 = 6 cao	A1

Answer: **0.625; expected 24; experimental higher by 6**

Question 2

22/25 cao	B1

Answer: **22/25**

Question 3

relative frequency 22/120 = 11/60 compared with 1/6, oe (accept 22 compared with the expected 20)	M1
The relative frequency is close to 1/6, so there is no evidence that the die is biased	A1

Answer: **The relative frequency is close to 1/6, so there is no evidence that the die is biased**

Question 4

1/4 x 40	M1
10 cao	A1

Answer: **10**

Question 5

124/200	M1
31/50 cao	A1

Answer: **31/50**

Question 6

relative frequency 200/600 = 1/3 compared with 1/6, oe (accept 200 compared with the expected 100)	M1
The relative frequency is much higher than 1/6, so the die may be biased	A1

Answer: **The relative frequency is much higher than 1/6, so the die may be biased**

Question 7

54/80	M1
27/40 cao	A1

Answer: **27/40**

Question 8

relative frequency 9/60 = 3/20 compared with 1/6, oe (accept 9 compared with the expected 10)	M1
The relative frequency is close to 1/6, so there is no evidence that the die is biased	A1

Answer: **The relative frequency is close to 1/6, so there is no evidence that the die is biased**

Question 9

97/100 cao	B1

Answer: **97/100**

Question 10

relative frequency 17/100	M1
17/100 x 500	M1
85 cao	A1

Answer: **85**

Question 11

relative frequency 102/600 = 17/100 compared with 1/6, oe (accept 102 compared with the expected 100)	M1
The relative frequency is close to 1/6, so there is no evidence that the die is biased	A1

Answer: **The relative frequency is close to 1/6, so there is no evidence that the die is biased**

Question 12

17/20 cao	B1

Answer: **17/20**

Question 13

3/4 x 60	M1
45 cao	A1

Answer: **45**

Question 14

correct method: heads divided by total 28/50 or equivalent	M1
0.56 or 56% cao	A1

Answer: **0.56**

Question 15

7/20 x 40	M1
14 cao	A1

Answer: **14**

Question 16

relative frequency 100/600 = 1/6 compared with 1/6, oe (accept 100 compared with the expected 100)	M1
The relative frequency is close to 1/6, so there is no evidence that the die is biased	A1

Answer: **The relative frequency is close to 1/6, so there is no evidence that the die is biased**

Question 17

1/20 x 80	M1
4 cao	A1

Answer: **4**

Question 18

36/100	M1
9/25 cao	A1

Answer: **9/25**

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Question 19

20/50	**M1**
0.4 and a correct comparison	**A1**

Answer: **0.4; close to 0.5**

Question 20

relative frequency 8/60 = 2/15 compared with 1/6, oe (accept 8 compared with the expected 10)	**M1**
The relative frequency is close to 1/6, so there is no evidence that the die is biased	**A1**

Answer: **The relative frequency is close to 1/6, so there is no evidence that the die is biased**

Question 21

0.56 cao	**B1**

Answer: **0.56**

Question 22

15/250 shown	**M1**
0.060 cao	**A1**

Answer: **0.060**

Question 23

(a) Line A: 15/500 = 0.03 cao	**B1**
(a) Line B: 16/400 = 0.04 cao	**B1**

(a) Answer: **Line A 0.03; Line B 0.04**

(b) compares 0.04 to 0.03	**M1**
(b) Line B has the higher defect rate because 0.04 > 0.03 cao	**A1**

(b) Answer: **Line B has the higher defect rate**

Question 24

70% cao	**B1**

Answer: **70%**

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