

Experimental Probability - Worksheet

Skill

Group A - Calculating experimental probability

Find the probability distribution for the experimental results below:

- 1) A dice is rolled 10 times. It lands on six 4 of those times.
What is the probability of rolling a six?
- 2) A dice is rolled 30 times. It lands on four 3 of those times.
What is the probability of rolling a four?
- 3) A dice is rolled 8 times and it lands on five 3 of those times.
What is the probability of rolling a 5?
- 4) A coin is flipped. It lands on heads 20 out of 50 times.
What is the probability of it landing on heads the next time?
- 5) A coin is flipped. It lands on tails 10 out of 35 times.
What is the probability of it landing on tails the next time?
- 6) A coin is flipped. It lands on heads 10 out of 55 times.
What is the probability of it landing on heads the next time?
- 7) A bag contains 3 green counters, 7 blue counters and 8 red counters.
Calculate the probability of drawing a red counter.
- 8) A bag contains 3 green counters, 7 blue counters and 8 red counters.
Calculate the probability of drawing a blue counter.
- 9) A bag contains 3 green counters, 7 blue counters and 8 red counters.
Calculate the probability of drawing a green counter.
- 10) A bus is late on 15 out of 50 journeys.
Calculate the probability that the bus is late again.
- 11) A bus is late on 15 out of 50 journeys.
Calculate the probability that the bus is on time.
- 12) A bus is late on 18 out of 60 journeys.
Calculate the probability that the bus is late again.

Experimental Probability - Worksheet

Group B - Calculating experimental probability from tables

Find the probability distribution for the experimental results below:

1)

	Red	Green	Blue	White
Frequency	5	5	2	8

2)

	Red	Green	Blue	White
Frequency	6	3	4	7

3)

	Red	Green	Blue	White
Frequency	4	5	2	8

4)

	Red	Green	Blue	White
Frequency	8	10	4	16

5)

	Red	Green	Blue	White
Frequency	14	51	22	13

6)

	Red	Green	Blue	White
Frequency	7	24	12	7

7)

	Red	Green	Blue	White
Frequency	18	12	24	26

8)

	Red	Green	Blue	White
Frequency	9	6	12	13

9)

	Red	Green	Blue	White
Frequency	8	14	8	10

10)

	Red	Green	Blue	White
Frequency	66	22	10	42

11)

	Red	Green	Blue	White
Frequency	34	11	4	21

12)

	Red	Green	Blue	White
Frequency	105	29	13	63

Experimental Probability - Worksheet

Group C - Using experimental probability

Work out an estimate for the number of times the events below occur:

- 1) A dice is rolled 140 times. $P(4) = 0.4$. Estimate the number of times it will land on a 4
- 2) A dice is rolled 120 times. $P(3) = 0.8$. Estimate the number of times it will land on a 3
- 3) A dice is rolled 120 times. $P(2) = 0.2$. Estimate the number of times it **won't** land on a 2
- 4) A biased coin is thrown 180 times. $P(\text{Tail}) = 0.6$.
Estimate the number of times it will land on tails.
- 5) A biased coin is thrown 110 times. $P(\text{Head}) = 0.7$.
Estimate the number of times it will land on heads.
- 6) A biased coin is thrown 140 times. $P(\text{Tail}) = 0.8$.
Estimate the number of times it will land on heads.
- 7) The probability you lose a game of chess is 0.45.
If you play 40 games, how many games would you expect to lose?
- 8) The probability you win a game of chess is 0.54.
If you play 50 games, how many games would you expect to win?
- 9) The probability you lose a game of chess is 0.4.
If you play 30 games, how many games would you expect to lose?
- 10) A club has 80 adult members and 180 junior members.
The probability that an adult member is female is 0.35
 - a) Find the total number of adult female members of the club.
 - b) The probability that a junior member is female is 0.45
Find the total number of female members of the club.
 - c) Find the total number of male members of the club.

Experimental Probability - Worksheet

Applied

- 1) What is the difference between experimental and theoretical probability?
- 2) A school has 200 boys and 220 girls.

The probability that a girl studies French is 0.6

The probability that a boy studies French is 0.42

Estimate the total number of students in the school who study French.

- 3) (a) A biased dice is rolled 30 times.
The results are below

3 6 3 6 6 6 5 6 6 3
1 1 4 2 2 6 6 3 6 6
4 3 6 6 6 3 6 3 4 6

Complete the frequency table.

Number	1	2	3	4	5	6
Frequency						

- (b) Calculate the experimental probabilities.
- (c) Is the dice biased?
Explain your answer.
- 4) A spinner lands on red, blue, yellow or green.
The table below shows the experimental probabilities after 300 spins.

Colour	Red	Blue	Yellow	Green
Probability	0.25	0.4	0.2	0.15

- (a) How many times did the spinner land on red?
- (b) How many times did the spinner land on yellow?
- (c) How many more times did the spinner land on blue than green?

Experimental Probability - Exam Questions

- 1) (a) Luke and Sharon want to estimate how many yellow sweets are in a jar of 500 sweets.

They each conducted an experiment. The table below shows their results.

	Number of trials	Number of yellow beans chosen
Luke	30	6
Sharon	120	18

Write down the experimental probability of Luke taking a yellow sweet.

.....
(2)

- (b) Write down the experimental probability of Sharon taking a yellow sweet.

.....
(2)

- (c) Whose experiment gives the more reliable estimate of the number of yellow sweets in the jar?

Give a reason for your answer.

.....
.....

(1)
(5 marks)

- 2) The probability that a biased dice will land on a six is 0.3.
The dice will be rolled 400 times.

Work out an estimate for the number of times the dice will land on a six.

.....
(2 marks)

Experimental Probability - Exam Questions

- 3) A spinner has four sections, each labelled A, B, C and D.
Jack and Donna spin the spinner a number of times.

The table below shows their results.

	Number of spins	Number of A's	Relative frequency of spinning an A
Luke	30	9	
Donna	140		0.35

Complete the table.

.....
(4 marks)

- 4) (a) A spinner can land on red, green, pink or blue.

The table below shows the probabilities that the spinner will land on red, green, pink or blue.

Colour	Red	Green	Pink	Blue
Probability	0.4	0.1	0.2	

Work out the probability the spinner will land on blue.

.....
(2)

- (b) The spinner is spun 300 times. Estimate how many times the spinner lands on pink.

.....
(2)
(4 marks)

Experimental Probability - Answers

	Question	Answer
	Skill Questions	
Group A	<p>Find the probability distribution for the experimental results below:</p> <p>1) A dice is rolled 10 times. It lands on six 4 of those times. What is the probability of rolling a six?</p> <p>2) A dice is rolled 30 times. It lands on four 3 of those times. What is the probability of rolling a four?</p> <p>3) A dice is rolled 8 times and it lands on five 3 of those times. What is the probability of rolling a 5?</p> <p>4) A coin is flipped. It lands on heads 20 out of 50 times. What is the probability of it landing on heads the next time?</p> <p>5) A coin is flipped. It lands on tails 10 out of 35 times. What is the probability of it landing on tails the next time?</p> <p>6) A coin is flipped. It lands on heads 10 out of 55 times. What is the probability of it landing on heads the next time?</p> <p>7) A bag contains 3 green counters, 7 blue counters and 8 red counters. Calculate the probability of drawing a red counter.</p> <p>8) A bag contains 3 green counters, 7 blue counters and 8 red counters. Calculate the probability of drawing a blue counter.</p> <p>9) A bag contains 3 green counters, 7 blue counters and 8 red counters. Calculate the probability of drawing a green counter.</p>	<p>1) 0.4</p> <p>2) 0.1</p> <p>3) $\frac{3}{8}$ or 0.375</p> <p>4) 0.4</p> <p>5) $\frac{10}{35}$ or $\frac{2}{7}$ or 0.29 (to 2 dp)</p> <p>6) $\frac{10}{55}$ or $\frac{2}{11}$ or 0.18 (to 2 dp)</p> <p>7) $\frac{8}{18}$ or $\frac{4}{9}$ or 0.44 (to 2 dp)</p> <p>8) $\frac{7}{18}$ or 0.39 (to 2 dp)</p> <p>9) $\frac{3}{18}$ or $\frac{1}{6}$ or 0.17 (to 2 dp)</p>

Experimental Probability - Answers

Group A	<p>10) A bus is late on 15 out of 50 journeys. Calculate the probability that the bus is late again.</p> <p>11) A bus is late on 15 out of 50 journeys. Calculate the probability that the bus is on time.</p> <p>12) A bus is late on 18 out of 60 journeys. Calculate the probability that the bus is late again.</p>	<p>10) 0.3</p> <p>11) 0.7</p> <p>12) 0.3</p>																																								
Group B	<p>Find the probability distribution for the experimental results below:</p> <p>1)</p> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>5</td><td>5</td><td>2</td><td>8</td></tr></table> <p>2)</p> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>6</td><td>3</td><td>4</td><td>7</td></tr></table> <p>3)</p> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>4</td><td>5</td><td>2</td><td>8</td></tr></table> <p>4)</p> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>8</td><td>10</td><td>4</td><td>16</td></tr></table>		Red	Green	Blue	White	Frequency	5	5	2	8		Red	Green	Blue	White	Frequency	6	3	4	7		Red	Green	Blue	White	Frequency	4	5	2	8		Red	Green	Blue	White	Frequency	8	10	4	16	<p>1) Red = 0.25 Green = 0.25 Blue = 0.1 White = 0.4</p> <p>2) Red = 0.3 Green = 0.15 Blue = 0.1 White = 0.35</p> <p>3) Red = $\frac{4}{19}$ or 0.21 (to 2 dp) Green = $\frac{5}{19}$ or 0.26 (to 2 dp) Blue = $\frac{2}{19}$ or 0.11 (to 2 dp) White = $\frac{8}{19}$ or 0.42 (to 2 dp)</p> <p>4) Red = $\frac{8}{38}$ or $\frac{4}{19}$ or 0.21 (to 2 dp) Green = $\frac{10}{38}$ or $\frac{5}{19}$ or 0.26 (to 2 dp) Blue = $\frac{4}{38}$ or $\frac{2}{19}$ or 0.11 (to 2 dp) White = $\frac{16}{38}$ or $\frac{8}{19}$ or 0.42 (to 2 dp)</p>
	Red	Green	Blue	White																																						
Frequency	5	5	2	8																																						
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	Red	Green	Blue	White																																						
Frequency	8	10	4	16																																						

Experimental Probability - Answers

Group B

5)

	Red	Green	Blue	White
Frequency	14	51	22	13

5) Red = 0.14

Green = 0.51

Blue = 0.22

White = 0.13

6)

	Red	Green	Blue	White
Frequency	7	24	12	7

6) Red = 0.14

Green = 0.48

Blue = 0.24

White = 0.14

7)

	Red	Green	Blue	White
Frequency	18	12	24	26

7) Red = $\frac{18}{80}$ or $\frac{9}{40}$ or 0.225Green = $\frac{12}{80}$ or $\frac{3}{20}$ or 0.15Blue = $\frac{24}{80}$ or $\frac{3}{10}$ or 0.3White = $\frac{26}{80}$ or $\frac{13}{40}$ or 0.325

8)

	Red	Green	Blue	White
Frequency	9	6	12	13

8) Red = $\frac{9}{40}$ or 0.225Green = $\frac{6}{40}$ or $\frac{3}{20}$ or 0.15Blue = $\frac{12}{40}$ or $\frac{3}{10}$ or 0.3White = $\frac{13}{40}$ or 0.325

9)

	Red	Green	Blue	White
Frequency	8	14	8	10

9) Red = $\frac{8}{40}$ or 0.2Green = $\frac{14}{40}$ or 0.35Blue = $\frac{8}{40}$ or 0.2White = $\frac{10}{40}$ or 0.25

10)

	Red	Green	Blue	White
Frequency	66	22	10	42

10) Red = $\frac{66}{140}$ or 0.47 (to 2 dp)Green = $\frac{22}{140}$ or 0.16 (to 2 dp)Blue = $\frac{10}{140}$ or 0.07 (to 2 dp)White = $\frac{42}{140}$ or 0.3

Experimental Probability - Answers

Group B	<div>11)</div> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>34</td><td>11</td><td>4</td><td>21</td></tr></table> <div>12)</div> <table><tr><td></td><td>Red</td><td>Green</td><td>Blue</td><td>White</td></tr><tr><td>Frequency</td><td>105</td><td>29</td><td>13</td><td>63</td></tr></table>		Red	Green	Blue	White	Frequency	34	11	4	21		Red	Green	Blue	White	Frequency	105	29	13	63	<div>11)</div> Red = $\frac{34}{60}$ or 0.57 (to 2 dp) Green = $\frac{11}{60}$ or 0.18 (to 2 dp) Blue = $\frac{4}{60}$ or 0.07 (to 2 dp) White = $\frac{11}{60}$ or 0.18 (to 2 dp) <div>12)</div> Red = $\frac{105}{210}$ or 0.5 Green = $\frac{29}{210}$ or 0.14 (to 2 dp) Blue = $\frac{13}{210}$ or 0.06 (to 2 dp) White = $\frac{63}{210}$ or 0.3
	Red	Green	Blue	White																		
Frequency	34	11	4	21																		
	Red	Green	Blue	White																		
Frequency	105	29	13	63																		
Group C	<p>Work out an estimate for the number of times the events below occur:</p> <div>1)</div> A dice is rolled 140 times. P(4) = 0.4. Estimate the number of times it will land on a 4 <div>2)</div> A dice is rolled 120 times. P(3) = 0.8. Estimate the number of times it will land on a 3 <div>3)</div> A dice is rolled 120 times. P(2) = 0.2. Estimate the number of times it will not land on a 2 <div>4)</div> A biased coin is thrown 180 times. P(Tail) = 0.6. Estimate the number of times it will land on tails. <div>5)</div> A biased coin is thrown 110 times. P(Head) = 0.7. Estimate the number of times it will land on heads.	<div>1)</div> 56 <div>2)</div> 96 <div>3)</div> 96 <div>4)</div> 108 <div>5)</div> 77																				

Experimental Probability - Answers

Group C	<p>6) A biased coin is thrown 140 times. $P(\text{Tail}) = 0.8$. Estimate the number of times it will land on heads.</p> <p>7) The probability you lose a game of chess is 0.45. If you play 40 games, how many games would you expect to lose?</p> <p>8) The probability you win a game of chess is 0.54. If you play 50 games, how many games would you expect to win?</p> <p>9) The probability you lose a game of chess is 0.4. If you play 30 games, how many games would you expect to lose?</p> <p>10) A club has 80 adult members and 180 junior members. The probability that an adult member is female is 0.35</p> <p>a) Find the total number of adult female members of the club.</p> <p>b) The probability that a junior member is female is 0.45. Find the total number of female members of the club.</p> <p>c) Find the total number of male members of the club.</p>	<p>6) 28</p> <p>7) 18</p> <p>8) 27</p> <p>9) 12</p> <p>10)</p> <p>a) 28</p> <p>b) $80 \times 0.35 + 180 \times 0.55 = 109$</p> <p>c) 151</p>
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Experimental Probability - Answers

	Question	Answer																												
	Applied Questions																													
1)	What is the difference between experimental and theoretical probability?	Theoretical probability is calculated using mathematical reasoning about what we expect to happen. Experimental probability is calculated by carrying out repeated trials and noting the outcomes.																												
2)	A school has 200 boys and 220 girls. The probability that a girl studies French is 0.6 and the probability that a boy studies French is 0.42. Estimate the total number of students in the school who study French.	$200 \times 0.42 + 220 \times 0.6$ $= 216$																												
3)	<p>a) A biased dice is rolled 30 times. The results are below</p> <p>3 6 3 6 6 6 5 6 6 3 1 1 4 2 2 6 6 3 6 6 4 3 6 6 6 3 6 3 4 6</p> <p>Complete the frequency table.</p> <table><tr><td>Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Frequency</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>b) Calculate the experimental probabilities.</p> <p>c) Is the dice biased? Explain your answer.</p>	Number	1	2	3	4	5	6	Frequency							<p>a)</p> <table><tr><td>Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Frequency</td><td>2</td><td>2</td><td>7</td><td>3</td><td>1</td><td>15</td></tr></table> <p>b)</p> <p>$P(1) = \frac{2}{30}$ or 0.07 (to 2 dp)</p> <p>$P(2) = \frac{2}{30}$ or 0.07 (to 2 dp)</p> <p>$P(3) = \frac{7}{30}$ or 0.23 (to 2 dp)</p> <p>$P(4) = \frac{3}{30}$ or 0.1</p> <p>$P(5) = \frac{1}{30}$ or 0.03 (to 2 dp)</p> <p>$P(6) = \frac{15}{30}$ or 0.5</p> <p>c) Yes. We'd expect the probabilities to be close to being equal ($\frac{1}{6}$ or 0.17 to 2 dp) if it was a fair dice.</p>	Number	1	2	3	4	5	6	Frequency	2	2	7	3	1	15
Number	1	2	3	4	5	6																								
Frequency																														
Number	1	2	3	4	5	6																								
Frequency	2	2	7	3	1	15																								

Experimental Probability - Answers

4)	<p>A spinner lands on red, blue, yellow or green.</p> <p>The table below shows the experimental probabilities after 300 spins.</p> <table><tr><td>Colour</td><td>Red</td><td>Blue</td><td>Yellow</td><td>Green</td></tr><tr><td>Probability</td><td>0.25</td><td>0.4</td><td>0.2</td><td>0.15</td></tr></table>	Colour	Red	Blue	Yellow	Green	Probability	0.25	0.4	0.2	0.15	
Colour	Red	Blue	Yellow	Green								
Probability	0.25	0.4	0.2	0.15								
	a) How many times did the spinner land on red?	a) 75										
	b) How many times did the spinner land on yellow?	b) 60										
	c) How many more times did the spinner land on blue than green?	c) 75										

Experimental Probability - Mark Scheme

	Question	Answer										
	Exam Questions											
1) (a)	<p>Luke and Sharon want to estimate how many yellow sweets are in a jar of 500 sweets.</p> <p>They each conducted an experiment. The table below shows their results.</p> <table><tr><td></td><td>Number of trials</td><td>Number of yellow beans chosen</td></tr><tr><td>Luke</td><td>30</td><td>6</td></tr><tr><td>Sharon</td><td>120</td><td>18</td></tr></table> <p>Write down the experimental probability of Luke taking a yellow sweet?</p>		Number of trials	Number of yellow beans chosen	Luke	30	6	Sharon	120	18	(a) $\frac{6}{30}$ or 0.2 For correct numerator (1) For correct denominator (1)	(2)
	Number of trials	Number of yellow beans chosen										
Luke	30	6										
Sharon	120	18										
(b)	Write down the experimental probability of Sharon taking a yellow sweet?	(b) $\frac{18}{120} = 0.15$ For correct numerator (1) For correct denominator (1)	(2)									
(c)	<p>Whose experiment gives the more reliable estimate of the number of yellow sweets in the jar?</p> <p>Give a reason for your answer.</p>	Sharon’s, because she did the experiment more times, so her data is more reliable.	(1)									
2)	<p>The probability that a biased dice will land on a six is 0.3.</p> <p>The dice will be rolled 400 times.</p> <p>Work out an estimate for the number of times the dice will land on a six.</p>	400×0.3 (1) 120 (1)	(2)									

Experimental Probability - Mark Scheme

3)	<p>A spinner has four sections, each labelled A, B, C and D.</p> <p>Jack and Donna spin the spinner a number of times.</p> <p>The table below shows their results.</p> <table><tr><td></td><td>Number of spins</td><td>Number of A's</td><td>Relative frequency of spinning an A</td></tr><tr><td>Luke</td><td>30</td><td>9</td><td></td></tr><tr><td>Donna</td><td>140</td><td></td><td>0.35</td></tr></table> <p>Complete the table.</p>		Number of spins	Number of A's	Relative frequency of spinning an A	Luke	30	9		Donna	140		0.35	140×0.35 (1) $= 49$ (1) $\frac{9}{30}$ (1) 0.3 (1)	
	Number of spins	Number of A's	Relative frequency of spinning an A												
Luke	30	9													
Donna	140		0.35												
4) (a)	<p>A spinner can land on red, green, pink or blue.</p> <p>The table below shows the probabilities that the spinner will land on red, green, pink or blue.</p> <table><tr><td>Colour</td><td>Red</td><td>Green</td><td>Pink</td><td>Blue</td></tr><tr><td>Probability</td><td>0.4</td><td>0.1</td><td>0.2</td><td></td></tr></table> <p>Work out the probability the spinner will land on blue.</p>	Colour	Red	Green	Pink	Blue	Probability	0.4	0.1	0.2		<p>(a) $1 - 0.4 - 0.1 - 0.2$ (1) 0.3 (1)</p>			
Colour	Red	Green	Pink	Blue											
Probability	0.4	0.1	0.2												
(b)	<p>The spinner is spun 300 times. Estimate how many times the spinner lands on pink.</p>	<p>(b) 300×0.2 (1) 60 (1)</p>													

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