Sample space - Worksheet

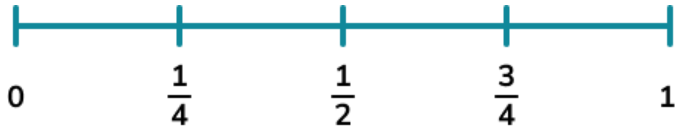
Skill

Group A - Probability scales

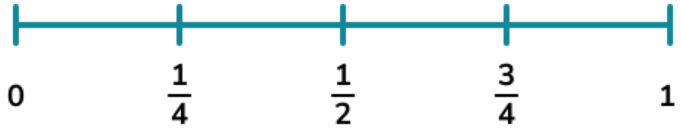
Indicating probabilities on a probability scale:

1) A fair 4-sided spinner numbered 2, 3, 5, and 8 is spun.

a. Mark with a (X) the probability of the spinner landing on an even number.



b. Mark with a (X) the probability of the spinner landing on a prime number.



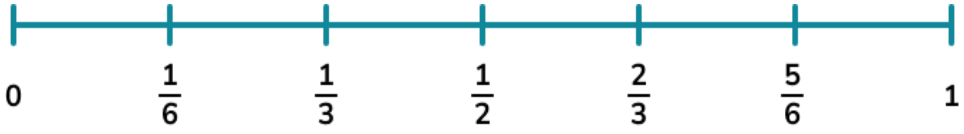
2) Five cards spelling the word “TIMES" are shuffled and one card is selected at random.

a. Mark with a (X) the probability of selecting a vowel.

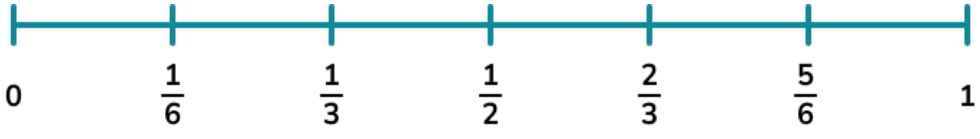
b. Mark with a (X) the probability of selecting a T.

3) A fair 6-sided die is rolled.

a. Mark with a (X) the probability of rolling a multiple of 3.



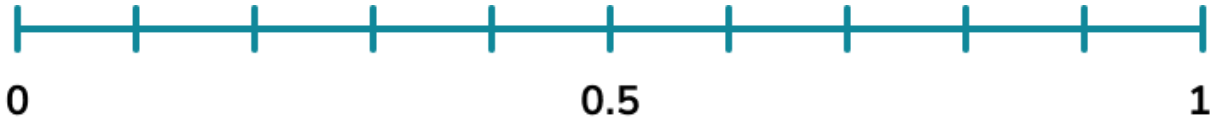
b. Mark with a (X) the probability of rolling a 7.



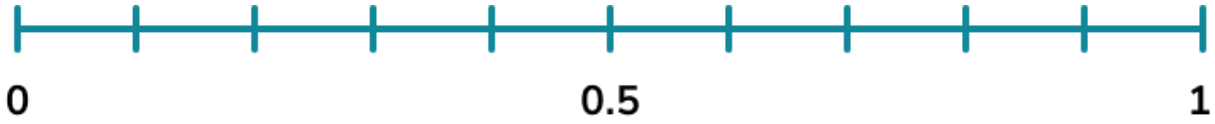
Sample space - Worksheet

4) Ten cards numbered 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are shuffled and a card is taken at random.

a. Mark with a (X) the probability of selecting an odd number.



b. Mark with a (X) the probability of selecting a number greater than 2.



Group B - Calculating simple probabilities and the probability of something *not* happening.

Calculate the probabilities of the random events, give your answer as fractions, decimals or percentages:

1) A bag contains 3 red counters and 5 blue counters. Find the probability of selecting a blue counter.

2) A bag contains 2 red counters, 3 blue counters and 1 yellow counter. Find P(yellow or red).

3) A fair 5-sided spinner is numbered 1 to 5. Find the probability of it landing on an even number.

4) A bag contains 4 green counters and 6 white counters. Find the probability of not selecting a white counter.

5) A box of chocolates contains 4 white chocolates, 6 milk chocolates and 3 dark chocolates. Find P(not milk).

6) A pack of pens contains 3 red pens, 2 green pens, 5 blue pens and 6 black pens. Find P(red or blue).

7) A fair 6-sided die is rolled. Find the probability of not rolling a multiple of 4.

8) A weather report claims the probability of snow tomorrow is 72%. What is the probability of it not snowing tomorrow?

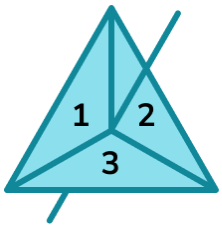
9) A bag contains 5 white counters, 7 black counters and 3 red counters. Find P(not red).

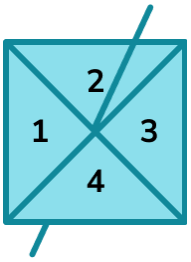
Sample space - Worksheet

Group C - Sample space

Complete the sample space diagram and find the probability:

1) The two fair spinners shown are spun and their scores added together.





a. Complete the sample space diagram for the possible outcomes.

	1	2	3
1	2	3	
2	3		
3	4		
4			

b. Find P(score less than 5)

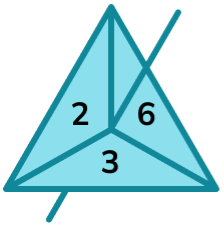
2) A fair coin is flipped and a fair 3-sided spinner numbered 1, 2, 3 is spun. If the coin shows Heads the score on the spinner is doubled. If the coin shows tails the score on the spinner remains the same.

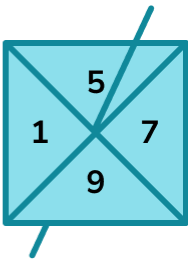
a. Complete the sample space diagram for the possible outcomes.

	1	2	3
H	2		
T	1		

b. Find P(even score)

3) The two fair spinners shown are spun and their scores multiplied together.



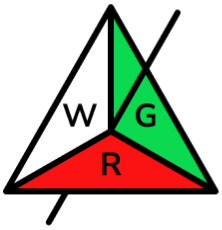


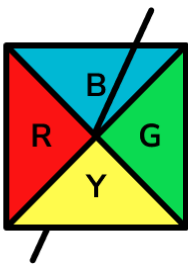
a. Complete the sample space diagram for the possible outcomes.

	2	3	6
1	2	3	
5	10		
7			
9			

b. Find P(score greater than 30)

4) The two fair spinners shown are spun and their colours recorded.





a. Complete the sample space diagram for the possible outcomes.

	Red	White	Green
Red		R, W	
Blue			
Yellow			
Green			G, G

b. Find P(at least one Green)

Sample space - Worksheet

Applied

1) There are only white and green counters in a bag. The probability of selecting a white counter is twice that of selecting a green counter.

(a) Find the probability of selecting a green counter.

(b) Explain why there cannot be 9 white counters in the bag.

2) A bag contains only blue, yellow and red counters. The probability of selecting a blue counter is $\frac{1}{3}$ and the probability of selecting a red counter is $\frac{2}{5}$

(a) Find the smallest number of counters they may be in the bag.

(b) If there are between 21 and 26 blue counters in the bag, find the number of yellow counters.

3) A 20p coin, a 10p coin and a 5p coin are flipped in a game. Each coin is fair and can show heads or tails.

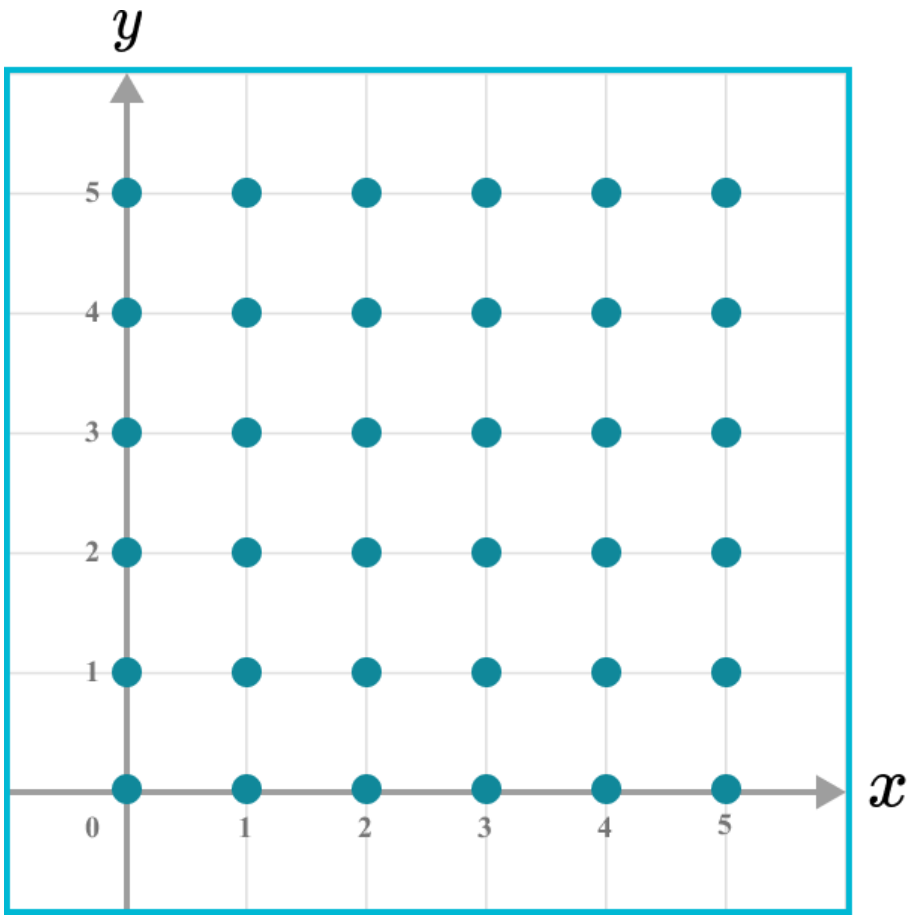
(a) Complete the table to show the different combinations.

20p	10p	5p
H	H	H
H	H	T

(b) A player wins the game if the total value of the coins showing Tails is greater than 20p. Find the probability of winning the game.

Sample space - Worksheet

4) A point is randomly selected from the coordinate grid shown. Each point can only take integer values from 0 to 5, e.g. $(2, 4)$ or $(1, 0)$.



(a) A point is chosen at random.
Find the probability that the point has the x-coordinate which is 4.

(b) Another point is chosen at random.
Find the probability the point has the same x and y coordinates.

(c) Another point is chosen at random.
Find the probability the point lies on the line with equation $y = 2x + 1$.

Sample space - Exam Questions

1) A weather report states that there is a 33% probability of rain.
What is the probability of it **not** raining?

.....

(2 marks)

---

2) A bag contains 30 counters. 7 are red, 11 are green and the rest are blue or white. There are twice as many blue counters as white counters. A counter is selected at random.
Find the probability of selecting a white counter.

.....

(3 marks)

---

3) A 4 sided spinner numbered 1, 2, 3 and 4 and a 3 sided spinner numbered 5, 7 and 9 are spun and the values on each added together.

(a) Complete the sample space diagram to find the possible outcomes.

	1	2	3	4
5	6	7		
7	8			
9				

(2)

(b) Find the probability that the sum of the values is prime.

.....

(2)

(4 marks)

Sample space - Exam Questions

4) A combination lock has three dials each numbered 1, 2 and 3.

John has forgotten his combination but he remembers that exactly two of the numbers are the same.

(a) Write a list of the possible combinations.

.....

(3)

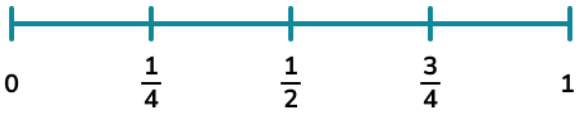
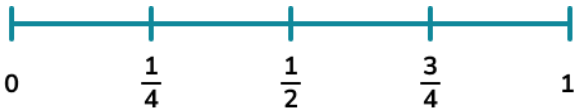
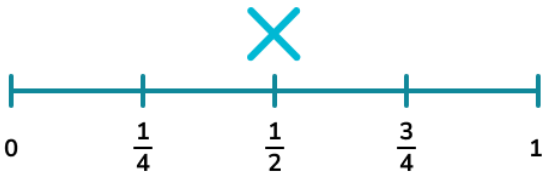
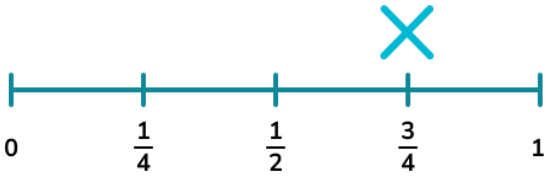
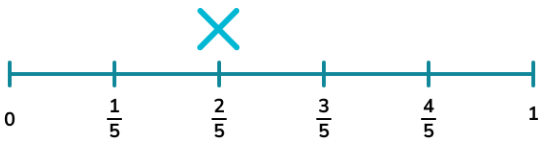
(b) Find the probability of the combination numbers having a sum of 5.

.....

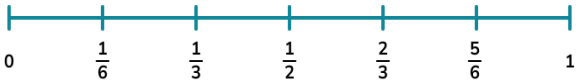
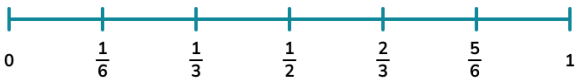
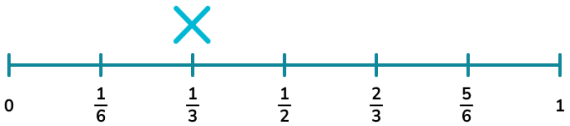
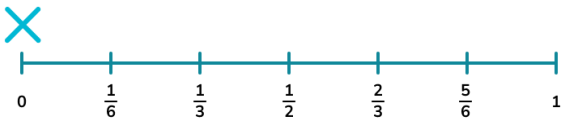
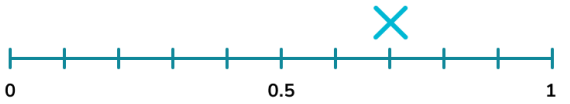
(2)

(5 marks)

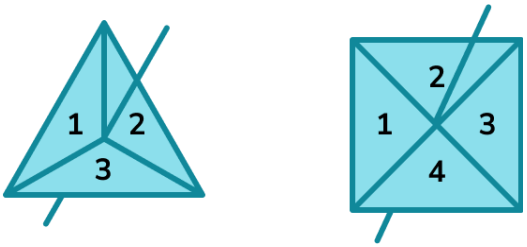
Sample space - Answers

	Question	Answer
	Skill Questions	
Group A	**1)** A fair 4-sided spinner numbered 2, 3, 5, and 8 is spun. **a.** Mark with a (X) the probability of the spinner landing on an even number.  **b.** Mark with a (X) the probability of the spinner landing on a prime number.  **2)** Five cards spelling the word "TIMES" are shuffled and one card is selected at random. **a.** Mark with a (X) the probability of selecting a vowel.  **b.** Mark with a (X) the probability of selecting a T.  	**1)** **a.** $\frac{1}{2}$  **b.** $\frac{3}{4}$  **2)** **a.** $\frac{2}{5}$  **b.** $\frac{1}{5}$ 

Sample space - Answers

Group A contd	**3)** A fair 6-sided die is rolled. **a.** Mark with a (X) the probability of rolling a multiple of 3.  **b.** Mark with a (X) the probability of rolling a 7.  **4)** Ten cards numbered 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are shuffled and a card is taken at random. **a.** Mark with a (X) the probability of selecting an odd number.  **b.** Mark with a (X) the probability of selecting a number greater than 2.  	**3)** **a.** $\frac{2}{6} = \frac{1}{3}$  **b.** 0  **4)** **a.** 0.5  **b.** 0.7 
Group B	**1)** A bag contains 3 red counters and 5 blue counters. Find the probability of selecting a blue counter. **2)** A bag contains 2 red counters, 3 blue counters and 1 yellow counter. Find P(yellow or red). **3)** A fair 5-sided spinner is numbered 1 to 5. Find the probability of it landing on an even number. **4)** A bag contains 4 green counters and 6 white counters. Find the probability of not selecting a white counter.	**1)** $\frac{5}{8}$ **2)** $\frac{3}{6}$ or $\frac{1}{2}$ **3)** $\frac{2}{5}$ **4)** $\frac{4}{10} = \frac{2}{5}$ or 0.4

Sample space - Answers

Group B contd	**5)** A box of chocolates contains 4 white chocolates, 6 milk chocolates and 3 dark chocolates. Find P(not milk). **6)** A pack of pens contains 3 red pens, 2 green pens, 5 blue pens and 6 black pens. Find P(red or blue) **7)** A fair 6-sided die is rolled. Find the probability of not rolling a multiple of 4. **8)** A weather report claims the probability of snow tomorrow is 72%. What is the probability of it not snowing tomorrow? **9)** A bag contains 5 white counters, 7 black counters and 3 red counters. Find P(not red).	**5)** $\frac{7}{13}$ **6)** $\frac{8}{16}$ or $\frac{1}{2}$ **7)** $\frac{5}{6}$ **8)** 28% **9)** $\frac{12}{15}$ or $\frac{4}{5}$
Group C	**1)** The two fair spinners shown are spun and their scores added together.  **a.** Complete the sample space diagram for the possible outcomes. **b.** Find P(score less than 5)	**1)** **a.** **b.** $\frac{6}{12}$ or $\frac{1}{2}$

	1	2	3
1	2	3	
2	3		
3	4		
4			

	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6
4	5	6	7

Sample space - Answers

Group C contd

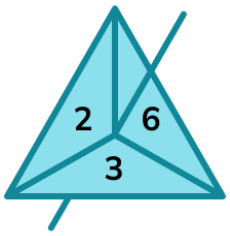
2) A fair coin is flipped and a fair 3-sided spinner numbered $1, 2, 3$ is spun.
If the coin shows Heads the score on the spinner is doubled.
If the coin shows tails the score on the spinner remains the same.

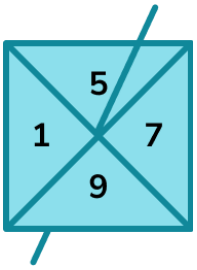
a. Complete the sample space diagram for the possible outcomes.

	1	2	3
H	2		
T	1		

b. Find P(even score)

3) The two fair spinners shown are spun and their scores multiplied together.





a. Complete the sample space diagram for the possible outcomes.

	2	3	6
1	2	3	
5	10		
7			
9			

b. Find P(score greater than 30)

2)

a.

	1	2	3
H	2	4	6
T	1	2	3

b. $\frac{4}{6}$ or $\frac{2}{3}$

3)

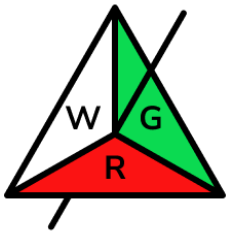
a.

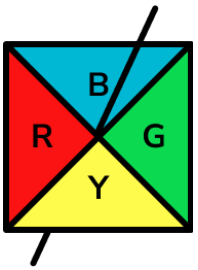
	2	3	6
1	2	3	6
5	10	15	30
7	14	21	42
9	18	27	54

b. $\frac{2}{12}$ or $\frac{1}{6}$

Sample space - Answers

4) The two fair spinners shown are spun and their colours recorded.





a. Complete the sample space diagram for the possible outcomes.

	Red	White	Green
Red		R, W	
Blue			
Yellow			
Green			G, G

b. Find P(at least one Green)

4)

a.

	Red	White	Green
Red	R,R	R,W	R,G
Blue	B,R	B,W	B,G
Yellow	Y,R	Y,W	Y,G
Green	G,R	G,W	G,G

b. $\frac{6}{12}$ or $\frac{1}{2}$

Sample space - Answers

	Question	Answer
	Applied Questions	
1)	There are only white and green counters in a bag. The probability of selecting a white counter is twice that of selecting a green counter. **a)** Find the probability of selecting a green counter. **b)** Explain why there cannot be 9 white counters in the bag.	**a)** $\frac{1}{3}$ **b)** Must be an even number of white counters.
2)	A bag contains only blue, yellow and red counters. The probability of selecting a blue counter is $\frac{1}{3}$ and the probability of selecting a red counter is $\frac{2}{5}$. **a)** Find the smallest number of counters they may be in the bag. **b)** If there are between 21 and 26 blue counters in the bag, find the number of yellow counters.	**a)** LCM of 3 and 5 is 15 **b)** $\frac{1}{3} \times 15 = 5$ yellow counters $\frac{2}{5} \times 15 = 6$ red counters Total number of counters must be a multiple of 15. B: 5, 10, 15, 20, **25** — Y: — — — — — — R: 6, 12, 18, 24, **30** — Total: 15, 30, 45, 60, **75** $75 - 25 - 30 = 20$

Sample space - Answers

3) A 20p coin, a 10p coin and a 5p coin are flipped in a game. Each coin is fair and can show heads or tails.

a) Complete the table to show the different combinations.

20p	10p	5p
H	H	H
H	H	T

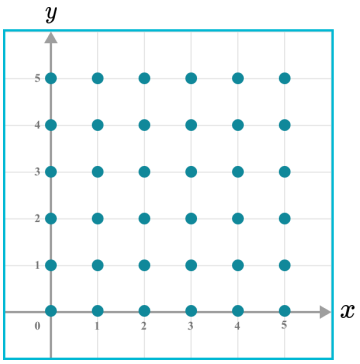
b) A player wins the game if the total value of the coins showing Tails is greater than 20p. Find the probability of winning the game.

a)

20p	10p	5p
H	H	H
H	H	T
H	T	H
T	H	H
T	T	H
T	H	T
H	T	T
T	T	T

b) $\frac{3}{8}$

4) A point is randomly selected from the coordinate grid shown. Each point can only take integer values from 0 to 5, e.g. $(2, 4)$ or $(1, 0)$.



a) A point is chosen at random. Find the probability that the point has the x-coordinate which is 4.

a) $\frac{6}{36}$ or $\frac{1}{6}$

b) Another point is chosen at random. Find the probability the point has the same x and y coordinates.

b) $\frac{6}{36}$ or $\frac{1}{6}$

c) Another point is chosen at random. Find the probability the point lies on the line with equation $y = 2x + 1$.

c) $\frac{3}{36}$ or $\frac{1}{12}$

Sample space - Mark Scheme

<table>
<tr><th></th><th>Question</th><th>Answer</th><th></th></tr>
<tr><td></td><td>Exam Questions</td><td></td><td></td></tr>
<tr><td>1)</td><td>A weather report states that there is a 33% probability of rain. What is the probability of it not raining?</td><td>$100\% - 33\%$ or $1 - 0.33$

67% or 0.67 oe</td><td>(1)

(1)</td></tr>
<tr><td>2)</td><td>A bag contains 30 counters. 7 are red, 11 are green and the rest are blue or white. There are twice as many blue counters as white counters. A counter is selected at random.
Find the probability of selecting a white counter.</td><td>$12 \div (2 + 1)$

Finding that there are 8 blue or 4 white counters

$\frac{4}{30}$ oe</td><td>(1)

(1)

(1)</td></tr>
<tr><td>3)

(a)</td><td>A 4 sided spinner numbered 1, 2, 3 and 4 and a 3 sided spinner numbered 5, 7 and 9 are spun and the values on each added together.

Complete the sample space diagram to find the possible outcomes.
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>5</td><td>6</td><td>7</td><td></td><td></td></tr>
<tr><td>7</td><td>8</td><td></td><td></td><td></td></tr>
<tr><td>9</td><td></td><td></td><td></td><td></td></tr>
</table></td><td>(a) 3 more values are filled in

Table complete with correct values
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr>
<tr><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr>
</table></td><td>(1)

(1)</td></tr>
<tr><td>(b)</td><td>Find the probability that the sum of the values is prime.</td><td>(b) Finds the prime numbers 7, 11, 13 or uses 4 as the numerator

$\frac{4}{12}$ oe</td><td>(1)

(1)</td></tr>
</table>

Sample space - Mark Scheme

<table>
<tr>
<td>4)

(a)</td>
<td>A combination lock has three dials each numbered 1, 2 and 3.
 

John has forgotten his combination but he remembers that exactly two of the numbers are the same.

Write a list of the possible combinations.</td>
<td>(a) Evidence of starting to list combinations using with 1, 1,.. 2, 2,.. 3, 3,..

At least 12 different combinations

All 18 correct combinations
<table><tr><td>1,1,2</td><td>2,2,1</td><td>3,3,1</td></tr><tr><td>1,2,1</td><td>2,1,2</td><td>3,1,3</td></tr><tr><td>2,1,1</td><td>1,2,2</td><td>1,3,3</td></tr><tr><td>1,1,3</td><td>2,2,3</td><td>3,3,2</td></tr><tr><td>1,3,1</td><td>2,3,2</td><td>3,2,3</td></tr><tr><td>3,1,1</td><td>3,2,2</td><td>2,3,3</td></tr></table></td>
<td>(1)

(1)

(1)</td>
</tr>
<tr>
<td>(b)</td>
<td>Find the probability of the combination numbers having a sum of 5.</td>
<td>(b) A fraction with a numerator 5 or a denominator 18
$\frac{6}{18}$ oe</td>
<td>(1)

(1)</td>
</tr>
</table>