School Name
Mathematics Test 2017

Year 7

Sample Space and Probability

Non Calculator Section

Name_____

Skills and Knowledge Assessed:

- Construct sample spaces for single- step experiments with equally likely outcomes (ACMSP167)
- Assign probabilities to the outcomes of events and determine probabilities for events (ACMSP168)
- Identify complementary events and use the sum of probabilities to solve problems (ACMSP204)

Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided.

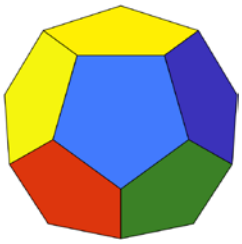
Show any working out on the test paper. Calculators are **not** allowed.

Questions 1 – 3 refer to the following:

A dodecahedron die has its faces painted in four different colours.

There are 4 green faces, 3 red faces, 3 blue faces and 2 yellow faces.

Thomas rolls the die once.



1. How many elements are there in the sample space for rolling the die once?

☐ 4 ☐ 7 ☐ 9 ☐ 12

2. What is the probability that the die has a red face showing upward?

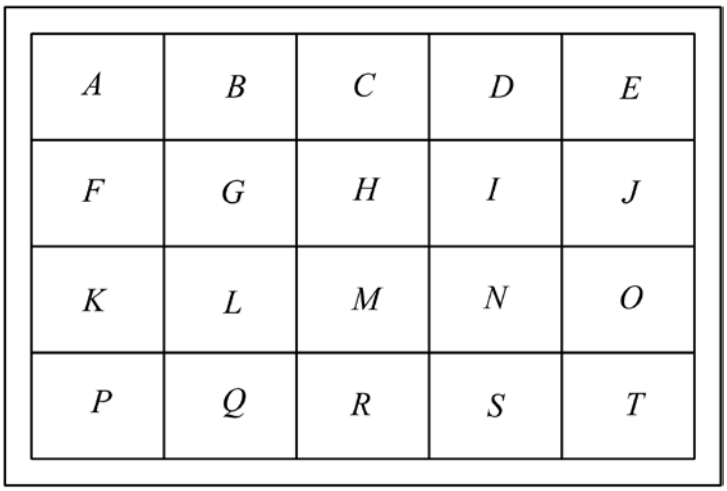
☐ $\frac{3}{12}$ ☐ $\frac{3}{9}$ ☐ $\frac{3}{7}$ ☐ $\frac{3}{4}$

3. What is the probability that the die has a yellow face showing upward?

$\frac{\square}{\square}$

Questions 4 – 6 refer to the following:

In a TV Game show there are a series of doors arranged as shown, and contestants choose a prize by selecting one of the doors.



A contestant chooses one of the doors at random.

4. What is the size of the sample space for choosing a door?

5. What is the probability that the contestant chooses a door on the top row?

☐ $\frac{4}{20}$ ☐ $\frac{5}{20}$ ☐ $\frac{4}{15}$ ☐ $\frac{5}{15}$

6. What is the probability that the contestant chooses a door labelled with a vowel?

☐ $\frac{4}{20}$ ☐ $\frac{5}{20}$ ☐ $\frac{4}{15}$ ☐ $\frac{5}{15}$

7. How would you describe the likelihood that a page of text in a normal book would contain no letter e's?

☐ Impossible ☐ Very unlikely ☐ Very likely ☐ Certain

8. Which event could be described as having an "even chance" of occurring?

☐ A "Spades" card being drawn from a normal pack of cards.

☐ A "Queen" card being drawn from a normal pack of cards.

☐ A normal die landing on a six.

☐ A normal die landing on an even number.

Questions 9 – 11 refer to the following:

Lucy has a collection of 35 music CD's.

She has classified them as follows:

Hip hop – 12

Electronic – 8

Rock – 11

Folk – 4

She chooses a CD at random from her collection.

9. What is the probability that it's genre is Electronic?

$\square$ / $\square$

10. What is the probability that it's genre is Rock?

☐ $\frac{1}{35}$ ☐ $\frac{1}{26}$ ☐ $\frac{11}{35}$ ☐ $\frac{11}{26}$

11. What is the probability that it's genre is folk or hip hop?

$\square$ / $\square$

12. A bucket contains 40 balls of mixed colours. Six of the balls are coloured blue.

A ball is selected at random from the bucket.

What is the probability that it is not blue?

$\square$ / $\square$

Questions 13 – 15 refer to the following:

Mary has a bunch of keys which contains 5 house keys, 2 car keys, 1 garage key, 6 keys for the shop where she works and 7 keys that she has no idea what they fit.

She chooses a key at random from the bunch.

13. What is the probability that it is a key to the house?

☐ $\frac{5}{21}$ ☐ $\frac{1}{3}$ ☐ $\frac{5}{16}$ ☐ $\frac{7}{16}$

14. What is the probability that the key is for the car or the garage?

$\frac{\square}{\square}$

15. What is the probability that she knows what the key fits?

☐ $\frac{1}{3}$ ☐ $\frac{7}{16}$ ☐ $\frac{2}{3}$ ☐ $\frac{7}{8}$

Questions 16 – 18 refer to the following.

Lois is buying a coloured fabric sofa.

The table shows the options available on the fabric samples.

Colour	Number of Shades
Blue	4
Green	2
Red	2
Grey	3
White	1

Lois picks one colour at random for her sofa.

16. What is the probability that she didn't choose a shade of grey?

☐ 0.25 ☐ 0.3 ☐ 0.44 ☐ 0.75

17. What is the probability that she chose a shade of blue or red?

$\frac{\square}{\square}$

18. What is the probability that she didn't choose a shade of green or white?

☐ $\frac{1}{6}$ ☐ $\frac{1}{4}$ ☐ $\frac{3}{4}$ ☐ $\frac{5}{6}$

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Calculator Allowed
Short Answer Section

Name_____

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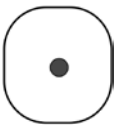
Shading in the bubble for the correct answer from the four choices provided.

Show any working out on this test paper. Calculators are allowed.

1.	A normal six-sided die is tossed once. Which of the following are not a part of the sample space? ▭  ▭  ▭  ▭ 
	Questions 2 - 4 refer to the following: A shopping centre parking area is full. It currently has 8 vans, 160 cars and 12 motorbikes parked in its spaces.
2.	One of the vehicles in the parking area is chosen at random. Which type of vehicle is it most likely to be? ▭

3. What is the probability that a vehicle chosen at random in the parking area will be a van?

$\frac{\square}{\square}$

4. The probability that a certain vehicle will be chosen at random from those in the parking area is $\frac{8}{9}$.

What type of vehicle is it?

- ☐ A car.
- ☐ A motorcycle.
- ☐ A van.
- ☐ None of the vehicles have this probability.

5. Which of these events would be least likely to happen on a single attempt?

- ☐ Drawing a heart from a normal pack of 52 cards.
- ☐ Drawing a red card from a normal pack of 52 cards.
- ☐ Rolling a number less than 6 on a normal die.
- ☐ Rolling a 6 on a normal die.

6. Organisers calculate that 55% of the audience at a concert are female.

One audience member is chosen at random.

What is the probability that the person is male?

$\frac{\square}{\square}$

7. Seventeen pets are entered in a pet show.

Six of the pets are cats and the rest are dogs.

The judge randomly picks one of the pets for a prize.

What is the probability that she picked a dog?

- ☐ $\frac{6}{17}$
- ☐ $\frac{11}{17}$
- ☐ $\frac{6}{11}$
- ☐ $\frac{16}{17}$

Questions 8 - 10 refer to the following:

There are 30 students in a class.

Ten have brown hair, seven have blonde hair, three have red hair and the remainder have black hair.

One of the students is chosen at random.

8. What is the likelihood that the student has red hair?

☐ Unlikely ☐ Even chance

☐ Likely ☐ Very likely

9. Which two hair colours are equally likely to be chosen?

☐ and ☐

10. What is the probability that the student has either brown or black hair?

☐/☐

Questions 11 - 13 refer to the following:

Josie is planning to paint her room, but cannot decide on the colour.

She takes 40 sample cards from the paint shop, of which 8 are blues, 7 are greens, 11 are reds and the rest are creams.

She randomly chooses one of the cards.

11. What is the probability that she chooses a shade of blue?

☐ $\frac{1}{40}$ ☐ $\frac{1}{16}$ ☐ $\frac{1}{8}$ ☐ $\frac{1}{5}$

12. What is the probability that she chooses either a blue or green shade?

☐/☐

13. What is the probability that she doesn't choose a cream shade?

☐ $\frac{7}{20}$ ☐ $\frac{3}{8}$ ☐ $\frac{13}{20}$ ☐ $\frac{5}{8}$

Questions 14 and 15 refer to the following:

A "Two Hundred Club" is run to raise money for a footy team.

The numbers 1 to 200 are placed on a board and people can buy any number that is available.

One of the numbers is then drawn out to win the prize.

14. Bill buys all the two digit numbers that end in or begin with the digit 1.

What is the probability that he will win? (Answer as a fraction in simplest form.)

$\frac{\square}{\square}$

15. Suzie buys all the tickets which are a multiple of 9, which Bill has not already bought.

What is the probability that she will win? (Answer as a decimal.)

☐

16. A six-sided die is painted so that each of its faces is either red or black.

When the die is tossed, it is twice as likely to land on red than on black.

How many of its faces are red?

☐

Questions 17 and 18 refer to the following:

Jose has five flocks of sheep on his property, which are different breeds.

The numbers of each breed are shown in the table below.

Breed	Number
Merino	150
Border Leicester	60
Suffolk	40
Corriedale	20
Dorset	30

One sheep is chosen at random by a Dept. of Agriculture inspector.

17. What is the probability that he will choose a Border Leicester or Suffolk breed?

$$\frac{\square}{\square}$$

18. What is the probability that it will be a breed other than Merino or Dorset?

☐ $\frac{1}{5}$ ☐ $\frac{2}{5}$ ☐ $\frac{3}{5}$ ☐ $\frac{4}{5}$

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ANSWERS

Question	Working and Answer
1.	No in SS = 4 + 3 + 3 + 2 = 12 **4th Answer**
2.	There are 3 red faces out of 12 altogether. $P(\text{Red}) = \frac{3}{12}$ **1st Answer**
3.	$P(\text{Yellow}) = \frac{\mathbf{2}}{\mathbf{12}} \left(= \frac{1}{6} \right)$
4.	There are 4 rows of 5 doors, so **20** altogether.
5.	There are 5 in the top row out of 20. $P(\text{Top Row}) = \frac{\mathbf{5}}{\mathbf{20}} \left(= \frac{1}{4} \right)$ **2nd Answer**
6.	Only vowels are A, E I and O. $P(\text{Vowel}) = \frac{\mathbf{4}}{\mathbf{20}} \left(= \frac{1}{5} \right)$ **1st Answer**
7.	The letter e is one of the most common in use, so to have no e's while not impossible, it is very unlikely. **2nd Answer**

Question	Working and Answer
8.	Even chance means probability of $\frac{1}{2}$. There are 3 even numbers on a die out of 6, so P(Even) - $\frac{1}{2}$ **4th Answer**
9.	There are 35 CDs altogether. 8 are electronic. $P(\text{Electronic}) = \mathbf{\frac{8}{35}}$
10.	$P(\text{Rock}) = \frac{11}{35}$ **3rd Answer**
11.	$P(\text{Folk or Hip hop}) = \frac{4+12}{35} = \mathbf{\frac{16}{35}}$
12.	6 balls are blue so 40-6=34 are not blue $P(\text{Not blue}) = \mathbf{\frac{34}{40}}\left(= \mathbf{\frac{17}{20}}\right)$
13.	Total keys = 5 + 2 + 1 + 6 + 7 = 21 $P(\text{House Key}) = \frac{5}{21}$ **1st Answer**
14.	$P(\text{Car or Garage}) = \frac{2+1}{21} = \mathbf{\frac{3}{21}}\left(= \frac{1}{7}\right)$
15.	$P(\text{Knows}) = \frac{5+2+1+6}{21} = \frac{14}{21} = \frac{2}{3}$ **3rd Answer**
16.	There are 12 colours available. 3 are shades of grey, so 12 – 3 = 9 are not $P(\text{not shade of grey}) = 9/12 = 3/4 = 0.75$ **4th Answer**
17.	$P(\text{Blue or Red}) = \frac{4+2}{12} = \frac{6}{12} = \mathbf{\frac{1}{2}}$

Question	Working and Answer
18.	$P(\text{Green or White}) = \frac{2+1}{12} = \frac{3}{12} = \frac{1}{4}$ $P(\text{Not Green or White}) = 1 - \frac{1}{4} = \mathbf{\frac{3}{4}}$

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Short Answer
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ANSWERS

Question	Working and Answer
1.	A normal die has faces with dots from 1 to 6, so seven dots is not in the sample space. **2nd Answer**
2.	There are more cars than other vehicles, so **cars** are most likely
3.	There are $8 + 160 + 12 = 180$ vehicles $P(\text{Van}) = \frac{\mathbf{8}}{\mathbf{180}} = \frac{\mathbf{4}}{\mathbf{90}} = \frac{\mathbf{2}}{\mathbf{45}}$
4.	There are $= 180$ vehicles $P(\text{Car}) = \frac{160}{180} = \frac{16}{18} = \frac{8}{9}$ Vehicle which has 160 in park is a car. **1st Answer**
5.	$P(\text{Heart}) = \frac{1}{4}$ $P(\text{Red card}) = \frac{1}{2}$ $P(\text{Number less than 6}) = \frac{5}{6}$ $P(\text{Number 6}) = \frac{1}{6}$ (This is the smallest probability) **4th Answer**

6.	55% are female, so 45% are male. So $P(\text{Male}) = \frac{45}{100} = \mathbf{\frac{9}{20}}$
7.	6 are cats, so 17 – 6 = 11 are dogs. $P(\text{Dog}) = \frac{11}{17}$ **2nd Answer**
8.	There are 30 altogether and only three have red hair so it is unlikely. **1st Answer**
9.	Brown +blonde +red = 10 + 7 + 3 = 20 So black = 30 – 20 = 10 **Brown and Black** both have 10, so are equally likely
10.	$P(\text{Brown or Black}) = \frac{10 + 10}{30} = \frac{20}{30} = \mathbf{\frac{2}{3}}$
11.	$P(\text{Shade of Blue}) = \frac{8}{40} = \frac{1}{5}$ **4th Answer**
12.	$P(\text{Blue or Green}) = \frac{8+7}{40} = \frac{15}{40} = \mathbf{\frac{3}{8}}$
13.	$P(\text{Not Cream}) = \frac{8+7+11}{40} = \frac{26}{40} = \frac{13}{20}$ **3rd Answer**
14.	Two digit numbers beginning with 1 are: 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 $P(\text{Bill wins}) = \frac{10}{200} = \mathbf{\frac{1}{20}}$
15.	Tickets which are multiples of 9 are: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99, 108, 117, 126, 135, 144, 153, 162, 171, 180, 189 and 198, so there are 22. Of these Bill has already bought 18 so 21 are left. $P(\text{Suzie wins}) = \frac{21}{200} = \mathbf{0.105}$

16. Need twice as many faces red than black out of six faces, so it is 2 black and **4 red faces**

17.

Breed	Number
Merino	150
Border	60
Suffolk	40
Corriedale	20
Dorset	30
Total	300

$$P(\text{B L or Suffolk}) = \frac{60+40}{300} = \frac{100}{300} = \mathbf{\frac{1}{3}}$$

18. Merino and Dorset total 180, so rest total 300 – 180 =120

$$P(\text{Not Merino and Dorset}) = \frac{120}{300} = \frac{2}{5}$$

2nd Answer