

High School Mathematics Test 2014

Year
7

Sample Space and Probability

Non Calculator
Section

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)

Name _____

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

Writing the answer in the box provided.

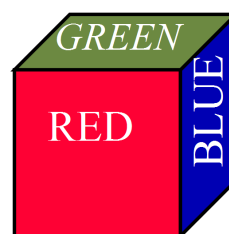
or

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:

In an experiment, Jack rolls a cube which has one red, two green and three blue faces.



1. List the sample space for the experiment.

2. What is the probability that the cube will show a red face uppermost?

3. What is the probability that it will show a blue face uppermost?

☐ $\frac{1}{6}$

☐ $\frac{1}{3}$

☐ $\frac{1}{2}$

☐ $\frac{2}{3}$

Questions 4 – 6 refer to the following

Mitchell is asked to pick a day in November for an appointment. He randomly chooses a date.

NOVEMBER 2014						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

4. How many outcomes are in the sample space?

5. What is the probability that he picks the 11th of November?

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

6. What is the probability that he picks a Monday (refer to the calendar shown above)?

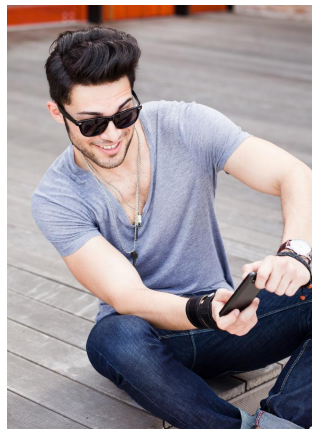
$$\frac{\square}{\square}$$

Questions 7 – 9 refer to the following :

Harry has some games on his phone.

Four are shooting games, two are driving games and six are adventure games.

He picks a game at random.



7. How many outcomes are in the sample space for Harry choosing a game?

8. What is the probability that Harry chooses a driving game?

<input type="text"/>
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<input type="text"/>

9. What is the probability that Harry chooses a shooting game?


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

10. Which term would best describe the likelihood of a large meteor hitting the school today?

☐ likely☐ unlikely☐ extremely unlikely☐ impossible

11. Which of these events would have a probability of zero?

☐ Drawing an ace from a normal pack.☐ Drawing a club from a normal pack.☐ Rolling a 1 on a normal die.☐ Rolling a 7 on a normal die.

12.	<p>A bag contains 4 red, 5 black, 3 pink, 2 yellow, 2 green and 4 blue marbles. A marble is drawn at random from the bag.</p> <p>What is the probability that it is red?</p> <div style="text-align: right;"> $\frac{\boxed{}}{\boxed{}}$ </div>
13.	<p>The probability of winning a game is $\frac{2}{5}$.</p> <p>What is the probability of not winning the game?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <input type="checkbox"/> $\frac{1}{5}$ <input type="checkbox"/> $\frac{2}{5}$ <input type="checkbox"/> $\frac{3}{5}$ <input type="checkbox"/> $\frac{4}{5}$ </div>
	<p>Questions 14 – 15 refer to the following :</p> <p>Kerrie spend 6 hours each day training for swimming trials.</p> <p>She also spends three hours each day eating and nine hours sleeping.</p> <div style="text-align: right;">  </div>
14.	<p>Kerrie's aunt in the UK who has trouble with time zones, rings at all sorts of random times. What is the probability that Kerrie is not sleeping when her aunt rings?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <input type="checkbox"/> $\frac{1}{4}$ <input type="checkbox"/> $\frac{3}{8}$ <input type="checkbox"/> $\frac{5}{8}$ <input type="checkbox"/> $\frac{3}{4}$ </div>
15.	<p>What is the probability that Kerrie is training or sleeping when her aunt rings?</p> <div style="text-align: right;"> $\frac{\boxed{}}{\boxed{}}$ </div>
16.	<p>Suzie drops over to visit Kerrie during the hours when she is awake. What is the probability that Kerrie is not eating or training when Suzie visits?</p> <div style="text-align: right;"> $\frac{\boxed{}}{\boxed{}}$ </div>

Questions 17 – 18 refer to the following :

Leisa observes the birds outside her window for an hour each morning for a week and records the number of each type of bird.

The results are recorded in the table below.

Type of Bird	Kookaburra	Noisy Miner	Shrike Thrush	Bower Bird	Wattle Bird
Number Observed	28	30	42	24	36

17. Based on Leisa's results, what is the probability that the next bird that will appear outside her window in the morning is a Noisy Miner?

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


18. What is the probability that the next bird would not be a Kookaburra?

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

High School Mathematics Test 2014

Year
7

Sample Space and Probability

Calculator Allowed
Short Answer
Section

Name _____

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 allowed.

Questions 1 and 2 refer to the following :

Five coloured cards are placed face down on a table.

Two are red and the rest are blue.

One card is selected at random.

1. Write down the sample space for this experiment.

2. What is the probability of drawing a blue card?

3. Which of these events could be described as being unlikely to occur in any single experiment?

- ☐ Drawing a red ace from a normal pack.
- ☐ Drawing a card from a red suit from a normal pack.
- ☐ Rolling a number less than 4 on a normal die.
- ☐ Rolling a 7 on a normal die.

4. Which probability indicates that there is “less than an even chance” of an event occurring?

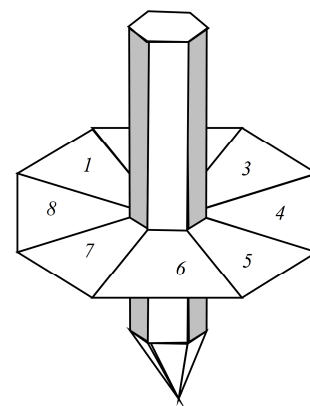
- ☐ 0.2 ☐ 0.5 ☐ 0.8 ☐ 1.0

5.	<p>A desk has twenty paperclips spread over it. Most of them are plastic coated but four are not. One paperclip is picked up at random.</p> <p>What is the probability that it is plastic coated?</p>	$\frac{\square}{\square}$
6.	<p>There are some candy bars in the Mandy's mum's bag. Three are Mors Bars, two are Snackers Bars and one is a Boast Bar. Mandy picks out one bar at random from the bag. What is the probability that it is a Snackers Bar?</p> <p> <input type="checkbox"/> $\frac{1}{6}$ <input type="checkbox"/> $\frac{1}{3}$ <input type="checkbox"/> $\frac{1}{2}$ <input type="checkbox"/> $\frac{2}{3}$ </p>	
	<p>Questions 7 and 8 refer to the following:</p> <p>A bag contains 100 marbles. There are 99 black marbles and 1 white marble. A marble is selected at random from the bag.</p>	
7.	<p>Which term describes the probability that the marble selected is white?</p> <p> <input type="checkbox"/> very likely <input type="checkbox"/> unlikely <input type="checkbox"/> very unlikely <input type="checkbox"/> impossible </p>	
8.	<p>What is the probability that the marble selected is black?</p> <p> <input type="checkbox"/> 0.01 <input type="checkbox"/> 0.1 <input type="checkbox"/> 0.9 <input type="checkbox"/> 0.99 </p>	
	<p>Questions 9 and 10 refer to the following:</p> <p>In a shopping centre car park there are 10 vans, 120 cars and 30 motorbikes. Louise picks a random vehicle in the car park to receive a free weeks parking.</p>	
9.	<p>What is the probability that the vehicle is a car ?</p> <p> <input type="checkbox"/> $\frac{1}{4}$ <input type="checkbox"/> $\frac{1}{3}$ <input type="checkbox"/> $\frac{2}{3}$ <input type="checkbox"/> $\frac{3}{4}$ </p>	
10.	<p>What is the probability that the vehicle is a van ?</p> <p style="text-align: center;"> $\frac{\square}{\square}$ </p>	

Questions 11 and 12 refer to the following:

Josie makes an octagonal spinner with equal sized sectors, numbered from 1 to 8.

She spins the spinner once.



11. What is the probability that it will land on a number which is less than 7?

☐ $\frac{1}{4}$

☐ $\frac{1}{3}$

☐ $\frac{2}{3}$

☐ $\frac{3}{4}$

12. What is the probability that it will land on a number which is a multiple of 3?

13. The Weather Bureau estimates the probability of rain tomorrow is 0.45.
What is the probability of it not raining tomorrow?

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Questions 14 and 15 refer to the following:

A set of pedestrian lights at a crossing near Felix house stay green for 30 seconds, then flash for 15 seconds and then remain red for 45 seconds.



14. What is the probability that it will not be green when Felix next reaches the crossing?

☐ $\frac{1}{6}$

☐ $\frac{1}{3}$

☐ $\frac{2}{3}$

☐ $\frac{5}{6}$

15. What is the probability that it will be flashing or green when Felix next reaches the crossing?

Questions 16 – 18 refer to the following:

Anjali finds a tetrahedron die in an old game box.
She rolls it 60 times to see if it is a fair die.
Her results are shown in the table below.



Number	1	2	3	4
Occurrences	12	14	14	20

16. Based on Anjali's experiment, is the die fair?
Explain your answer.

.....
.....

17. Based on Anjali's experiment, what is the probability of rolling a number more than 2 on the die?

☐ $\frac{13}{30}$

☐ $\frac{17}{30}$

☐ $\frac{2}{3}$

☐ $\frac{4}{5}$

18. Based on Anjali's experiment, what is the probability of not rolling a 3?

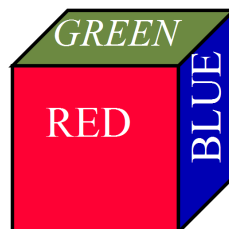
$$\frac{\boxed{}}{\boxed{}}$$

High School Mathematics Test 2014

Sample Space and Probability ANSWERS

Non Calculator Section (1 mark each)

Questions 1 – 3 refer to the following:
In an experiment, Jack rolls a cube which has one red, two green and three blue faces.



1. List the sample space for the experiment.

{ Red, Green, Green, Blue, Blue Blue }

2. What is the probability that the cube will show a red face uppermost?

$$\frac{1}{6}$$

3. What is the probability that it will show a blue face uppermost?

☐ $\frac{1}{6}$

☐ $\frac{1}{3}$

☒ $\frac{1}{2}$

☐ $\frac{2}{3}$

Questions 4 – 6 refer to the following

Mitchell is asked to pick a day in November for an appointment. He randomly chooses a date.

NOVEMBER 2014						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

4. How many outcomes are in the sample space?

30

5. What is the probability that he picks the 11th of November?

$$\frac{1}{30}$$

6. What is the probability that he picks a Monday (refer to the calendar shown above)?

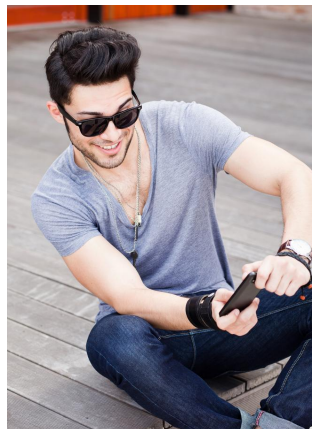
$$\frac{4}{30} = \frac{2}{15}$$

Questions 7 – 9 refer to the following :

Harry has some games on his phone.

Four are shooting games, two are driving games and six are adventure games.

He picks a game at random.



7. How many outcomes are in the sample space for Harry choosing a game?

12

8. What is the probability that Harry chooses a driving game?

$$\frac{2}{12} = \frac{\boxed{1}}{\boxed{6}}$$

9. What is the probability that Harry chooses a shooting game?

$$\frac{4}{12} = \boxed{\text{■}} \frac{1}{3} \quad \boxed{} \frac{1}{2} \quad \boxed{} \frac{2}{3} \quad \boxed{} \frac{3}{4}$$

10. Which term would best describe the likelihood of a large meteor hitting the school today?

☐ likely ☐ unlikely
☒ extremely unlikely ☐ impossible

11. Which of these events would have a probability of zero?

☐ Drawing an ace from a normal pack.
☐ Drawing a club from a normal pack.
☐ Rolling a 1 on a normal die.
☒ Rolling a 7 on a normal die.

12. A bag contains 4 red, 5 black, 3 pink, 2 yellow, 2 green and 4 blue marbles. A marble is drawn at random from the bag.

What is the probability that it is red?

$$\frac{4}{20} = \frac{1}{5}$$

$$\frac{\boxed{1}}{\boxed{5}}$$

13. The probability of winning a game is $\frac{2}{5}$.

What is the probability of not winning the game? $P(\text{not win}) = 1 - P(\text{win}) = 1 - \frac{2}{5} = \frac{3}{5}$

☐ $\frac{1}{5}$

☐ $\frac{2}{5}$

☒ $\frac{3}{5}$

☐ $\frac{4}{5}$

Questions 14 – 15 refer to the following :

Kerrie spend six hours each day training for swimming trials.

She also spends three hours each day eating and nine hours sleeping.



14. Kerrie's aunt in the UK who has trouble with time zones, rings at all sorts of random times. What is the probability that Kerrie is not sleeping when her aunt rings?

$$P(\text{Not Sleeping}) = 1 - P(\text{Sleeping}) = 1 - \frac{9}{24} = \frac{15}{24} = \frac{5}{8}$$

☐ $\frac{1}{4}$

☐ $\frac{3}{8}$

☒ $\frac{5}{8}$

☐ $\frac{3}{4}$

15. What is the probability that Kerrie is training or sleeping when her aunt rings?

$$P(\text{Train or Sleep}) = \frac{6 + 9}{24} = \frac{15}{24} = \frac{5}{8}$$

$$\frac{\boxed{5}}{\boxed{8}}$$

16. Suzie drops over to visit Kerrie during the hours when she is awake.
What is the probability that Kerrie is not eating or training when Suzie visits?

$$\begin{aligned}
 &P(\text{Not eating or training when awake}) \\
 &= 1 - P(\text{Eating or training when awake}) \\
 &= 1 - \frac{3+6}{15} = 1 - \frac{9}{15} = \frac{6}{15} = \frac{2}{5}
 \end{aligned}$$

$$\frac{\boxed{2}}{\boxed{5}}$$

Questions 17 – 18 refer to the following :

Leisa observes the birds outside her window for an hour each morning for a week and records the number of each type of bird.
The results are recorded in the table below.

Type of Bird	Kookaburra	Noisy Miner	Shrike Thrush	Bower Bird	Wattle Bird
Number Observed	28	30	42	24	36

17. Based on Leisa's results, what is the probability that the next bird that will appear outside her window in the morning is a Noisy Miner?

$$P(NM) = \frac{30}{160} = \frac{3}{16}$$

$$\frac{\boxed{3}}{\boxed{16}}$$



18. What is the probability that the next bird would not be a Kookaburra?
 $P(\text{Not Kookaburra}) =$

$$\begin{aligned}
 1 - P(\text{Kookaburra}) &= 1 - \frac{28}{160} \\
 &= \frac{132}{160} = \frac{33}{40}
 \end{aligned}$$

$$\frac{\boxed{33}}{\boxed{40}}$$

High School Mathematics Test 2014

Calculator Allowed Short Answer Section (1 mark each)

Questions 1 and 2 refer to the following :

Five coloured cards are placed face down on a table.
Two are red and the rest are blue.
One card is selected at random.

1. Write down the sample space for this experiment.

{Red, Red, Blue, Blue, Blue}

2. What is the probability of drawing a blue card?

$$\frac{\boxed{3}}{\boxed{5}}$$

3. Which of these events could be described as being unlikely to occur in any single experiment?

- ☒ Drawing a red ace from a normal pack.
☐ Drawing a card from a red suit from a normal pack.
☐ Rolling a number less than 4 on a normal die.
☐ Rolling a 7 on a normal die.

4. Which probability indicates that there is “less than an even chance” of an event occurring?

- ☒ 0.2 ☐ 0.5 ☐ 0.8 ☐ 1.0

5. A desk has twenty paperclips spread over it.
Most of them are plastic coated but four are not.
One paperclip is picked up at random.

$$\frac{16}{20} = \frac{4}{5} \quad \frac{\boxed{4}}{\boxed{5}}$$

What is the probability that it is plastic coated?

6.

There are some candy bars in the Mandy's mum's bag.
 Three are Mors Bars, two are Snackers Bars and one is a Boast Bar.
 Mandy picks out one bar at random from the bag.
 What is the probability that it is a Snackers Bar?

$$\frac{2}{6} = \frac{1}{3}$$

☐ $\frac{1}{6}$

☒ $\frac{1}{3}$

☐ $\frac{1}{2}$

☐ $\frac{2}{3}$

Questions 7 and 8 refer to the following:

A bag contains 100 marbles.
 There are 99 black marbles and 1 white marble.
 A marble is selected at random from the bag.

7.

Which term describes the probability that the marble selected is white?

☐ very likely

☐ unlikely

☒ very unlikely

☐ impossible

8.

What is the probability that the marble selected is black?

☐ 0.01

☐ 0.1

☐ 0.9

☒ 0.99

Questions 9 and 10 refer to the following:

In a shopping centre car park there are 10 vans, 120 cars and 30 motorbikes.
 Louise picks a random vehicle in the car park to receive a free weeks parking.

9.

What is the probability that the vehicle is a car? $P(\text{Car}) = \frac{120}{160} = \frac{3}{4}$

☐ $\frac{1}{4}$

☐ $\frac{1}{3}$

☐ $\frac{2}{3}$

☒ $\frac{3}{4}$

10.

What is the probability that the vehicle is a van ?

$$P(\text{Van}) = \frac{10}{160} = \frac{1}{16}$$

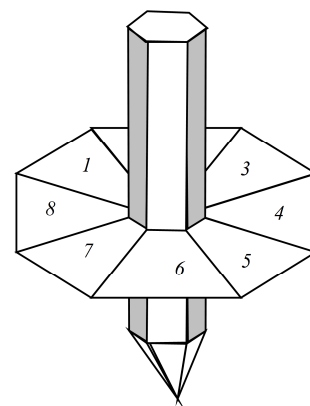
1

16

Questions 11 and 12 refer to the following:

Josie makes an octagonal spinner with equal sized sectors, numbered from 1 to 8.

She spins the spinner once.



11. What is the probability that it will land on a number which is less than 7?

☐ $\frac{1}{4}$

☐ $\frac{1}{3}$

☐ $\frac{2}{3}$

☒ $\frac{3}{4}$

12. What is the probability that it will land on a number which is a multiple of 3?

$$\frac{1}{4}$$

13. The Weather Bureau estimates the probability of rain tomorrow is 0.45.
What is the probability of it not raining tomorrow?

0.55

Questions 14 and 15 refer to the following:

A set of pedestrian lights at a crossing near Felix house stay green for 30 seconds, then flash red for 15 seconds and then remain red for 45 seconds.



14. What is the probability that it will not be green when Felix next reaches the crossing?

☐ $\frac{1}{6}$

☐ $\frac{1}{3}$

☒ $\frac{2}{3}$

☐ $\frac{5}{6}$

15. What is the probability that it will be flashing or green when Felix next reaches the crossing?

$$P(\text{Flash or green}) = \frac{15 + 30}{90} = \frac{45}{90} = \frac{1}{2}$$

$$\frac{1}{2}$$

Questions 16 – 18 refer to the following:

Anjali finds a tetrahedron die in an old game. She rolls it 60 times to see if it is a fair die. Her results are shown in the table below.



Number	1	2	3	4
Occurrences	12	14	14	20

16. Based on Anjali's experiment, is the die fair? Explain your answer.

$$P(4) = \frac{20}{60} = \frac{1}{3} \approx 0.33 \quad P(2) = P(3) = \frac{14}{60} = \frac{7}{30} \approx 0.23$$

$$P(1) = \frac{12}{60} = \frac{1}{5} \approx 0.20$$

The die is not fair as there is a higher probability of getting a 4 than any other number.

17. Based on Anjali's experiment, what is the probability of rolling a number more than 2 on the die?

☐ $\frac{13}{30}$

☒ $\frac{17}{30}$

☐ $\frac{2}{3}$

☐ $\frac{4}{5}$

18. Based on Anjali's experiment, what is the probability of not rolling a 3?

$$P(\text{Not } 3) = 1 - P(3)$$

$$= 1 - \frac{14}{60} = \frac{23}{30}$$

23
30