High School Mathematics Test 2013

Year 8

Further Probability

Non Calculator Section

Name_____

Skills and Knowledge Assessed:

- Identify complementary events and use the sum of probabilities to solve problems (ACMSP204)
- Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'. (ACMSP205)
- Represent events in two-way tables and Venn diagrams and solve related problems (ACMSP292)

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.

1. What is the probability of rolling a number less than three on a single roll of a die?

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

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2. Nathan's toolbox has a lot of tools mixed up in it.
There are 6 screwdrivers, 8 spanners and 4 wrenches.
Nathan picks a single tool from the toolbox at random.
What is the probability that it is a screwdriver?

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

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3. A spinner used in a board game has 8 equal divisions, numbered from 1 to 8.
What is the probability (as a fraction) of the spinner stopping on a number which is a multiple of 3?

☐ $\frac{1}{8}$ ☐ $\frac{1}{6}$ ☐ $\frac{1}{4}$ ☐ $\frac{1}{3}$

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4. A single card is drawn from a normal pack of 52 cards. What is the probability that it is not an Ace?

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

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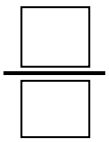
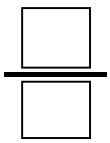
5. A chess board has 64 squares, half of which are white and half black.
Ten black squares have chess pieces on them, as do six white squares.
One chess piece is chosen at random.
What is the probability that it is on a white square?



6. Ten letter tiles from a word game have been used to make the word below.
One tile is chosen at random from those shown.

M	U	S	C	U	L	A	R

What is the probability that the tile chosen is the letter U or the letter C?



7. What is the probability of rolling a number which is even and less than 5 in a single roll of a die?

☐ $\frac{1}{6}$ ☐ $\frac{1}{4}$ ☐ $\frac{1}{3}$ ☐ $\frac{1}{2}$

8. The table shows the results of a survey of eye colours of a random sample of 36 people.

Eye Colour	Frequency
Blue	10
Brown	12
Green	8
Hazel	4
Black	2

One person is chosen at random from those who were surveyed.
What is the probability that they have green or hazel eyes?

☐ $\frac{1}{6}$ ☐ $\frac{1}{9}$ ☐ $\frac{2}{9}$ ☐ $\frac{1}{3}$

Questions 9 to 12 refer to the two way table below, which shows the skills of a group of employees in a company.

	Drives	Doesn't Drive	Totals
Can Repair Computers	12	14	26
Can't Repair Computers	18	6	24
Totals	30	20	50

One person is chosen at random from the employees.

9. What is the probability that the person can repair computers?

☐ $\frac{2}{5}$ ☐ $\frac{7}{10}$ ☐ $\frac{13}{25}$ ☐ $\frac{3}{5}$

10. What is the probability that the person drives and can repair computers?

☐ $\frac{6}{25}$ ☐ $\frac{2}{5}$ ☐ $\frac{6}{13}$ ☐ $\frac{19}{25}$

11. What is the probability that the person can either repair computers or drive (or both)?

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

12. If it known that the person can drive, what is the probability that they can repair computers?

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

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Further 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.

1. Marcos is watching a full game of tennis on commercial television.
The chance that he will see an advertisement would be described as:

☐ Certain. ☐ Impossible. ☐ Very likely. ☐ Very Unlikely.

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2. A single card is drawn from a normal pack of 52 playing cards. What is the probability that it is a card with 3, 5, 7 or 9 on it?

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

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3. A container holds 40 marbles numbered 1 to 40.
A single marble is drawn out.
What is the probability that it is a number greater than 32?

☐ $\frac{1}{40}$ ☐ $\frac{1}{10}$ ☐ $\frac{1}{8}$ ☐ $\frac{1}{5}$

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4. Tabitha's MP3 player has 250 songs on it, 100 of which are by her favourite artist Misti.
She sets the MP3 player to shuffle the songs randomly.
What is the probability that the first song will be by Misti?

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

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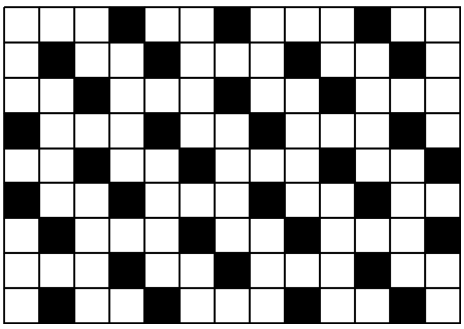
5. A rectangular floor is tiled with square black tiles and white tiles as shown.
A coin is dropped on the floor, and rolls around randomly until it stops on one of the tiles.
What is the probability that it stops on a black tile?



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

6. The container in a Lotto game holds 36 balls numbered 1 to 36.
The first ball is drawn out.
What is the probability that it is a number greater than 30?

☐ $\frac{1}{36}$ ☐ $\frac{1}{18}$ ☐ $\frac{1}{12}$ ☐ $\frac{1}{6}$

7. The table shows the results of a survey of favourite sports.
One person is chosen at random from those who took the survey.
What is the probability that the person liked football or tennis?

Sport	Frequency
Hockey	5
Football	8
Basketball	3
Tennis	4

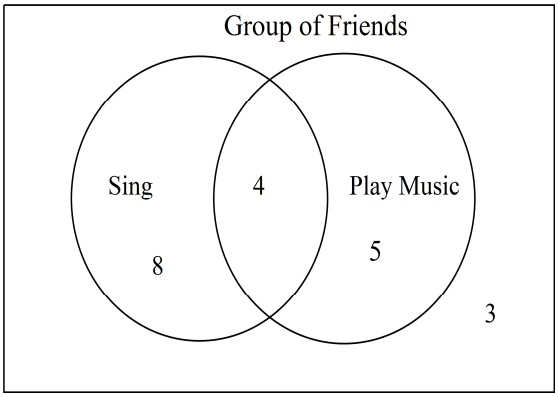
☐ $\frac{1}{5}$ ☐ $\frac{1}{4}$

☐ $\frac{2}{5}$ ☐ $\frac{3}{5}$

8. The probability that Aaron wins a game is $\frac{4}{5}$. What is the probability Aaron doesn't win the game?

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

Questions 9 to 12 refer to the Venn diagram below.
In a group of 20 friends, some sing and some play an instrument, the Venn diagram shows the numbers who do each.



One of the friends is chosen at random from the group.

9. What is the probability that the friend who is chosen plays a musical instrument?

☐ $\frac{1}{5}$ ☐ $\frac{1}{4}$ ☐ $\frac{9}{20}$ ☐ $\frac{11}{20}$

10. What is the probability that the friend who is chosen plays a musical instrument and sings?

☐ $\frac{1}{5}$ ☐ $\frac{1}{4}$ ☐ $\frac{9}{20}$ ☐ $\frac{11}{20}$

11. What is the probability that the friend who is chosen plays a musical instrument or sings or does both?

☐ $\frac{9}{20}$ ☐ $\frac{11}{20}$ ☐ $\frac{3}{5}$ ☐ $\frac{17}{20}$

12. If we know that the friend who is chosen plays a musical instrument, what is the probability that they also sing?

☐ $\frac{4}{9}$ ☐ $\frac{1}{2}$ ☐ $\frac{5}{9}$ ☐ $\frac{9}{20}$

High School Mathematics Test 2013

Year 8

Further Probability

Calculator Allowed Longer Answer Section

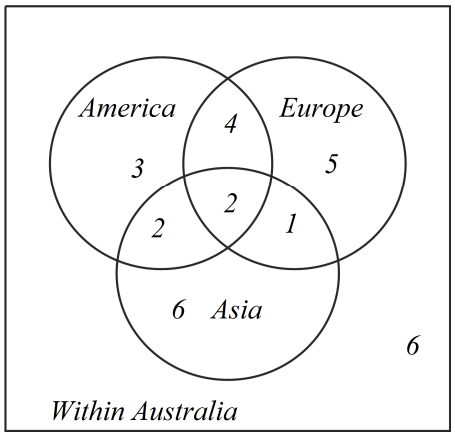
Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. A teacher asked the students in her class what the most interesting holiday destination was that they had been to in the past.
The Venn diagram which shows the results of their choices.
The teacher chose one student at random to write about their holidays.

Most Interesting Holiday Destinations for Students in a Class



(a) How many students were in the class? **1**

……..

(b) What is the probability that the teacher chose a student who had been to all three overseas destinations? **1**

……..

(c) What is the probability that the teacher chose a student who had been to two overseas destinations, but not all three? **2**

……..

……..

Marks

(d) If the teacher only chose from those who had been overseas, what is the probability that she chose a student who had not been to Asia? **2**

……..

……..

2. A coach does a study of the results of a number of football teams over a season. He compared whether they had the lead at half-time and whether they won the game.
The results are shown in the two way table.

	Led at Half-Time	**Didn't Lead at Half- Time**	**Total**
Won Game	32	6	38
Didn't Win Game	14	28	42
Total	46	34	

One result is chosen at random from all those analysed to be studied in more depth.

(a) How many results were analysed altogether? **1**

……..

(b) What is the probability that the result chosen was for a team which won the game. **1**

……..

(c) What is the probability that the result chosen was for a team which lead at half time but didn't win the game? **1**

……..

(d) If the result was chosen only from those who won the game, what is the probability that the team led at half time? **1**

……..

……..

Marks

(e) What is the probability that the situation in the game was the same at half time and full time? **2**

……..

……..

High School
Mathematics Test 2013

Year 8

Further Probability

ANSWERS

Non Calculator Section

1.	$\frac{2}{6} = \frac{1}{3}$
2.	$\frac{6}{18} = \frac{1}{3}$
3.	$\frac{2}{8} = \frac{1}{4}$
4.	$\frac{12}{13}$
5.	$\frac{6}{16} = \frac{3}{8}$
6.	$\frac{3}{8}$

7.	$\frac{1}{3}$
8.	$\frac{12}{36} = \frac{1}{3}$
9.	$\frac{13}{25}$
10.	$\frac{6}{25}$
11.	$\frac{44}{50} = \frac{22}{25}$
12.	$\frac{12}{30} = \frac{2}{5}$

Calculator Allowed Section

1.	Certain.
2.	$\frac{4}{13}$
3.	$\frac{1}{5}$
4.	$\frac{100}{250} = \frac{2}{5}$
5.	$\frac{33}{117} = \frac{11}{39}$
6.	$\frac{1}{6}$
7.	$\frac{12}{20} = \frac{3}{5}$

8.	$1 - \frac{4}{5} = \frac{1}{5}$
9.	$\frac{9}{20}$
10.	$\frac{1}{5}$
11.	$\frac{17}{20}$
12.	$\frac{4}{9}$

Calculator Allowed Longer Answer Section		
1.	(a) Number of students = 4+3+5+2+2+1+6+6 = 29	**1**
	(b) $P(\text{Three destinations}) = \frac{2}{29}$	**1**
	(c) $P(\text{Two Destinations}) = \frac{4+2+1}{29}$ $= \frac{7}{29}$	**2**
	(d) $P(\text{not Asia given Overseas}) = \frac{3+4+5}{23}$ $= \frac{12}{23}$	**2**
2.	(a) 80 results	**1**
	(b) $P(\text{Win Game}) = \frac{38}{80} = \frac{19}{40}$	**1**
	(c) $P(\text{Led and didn't win}) = \frac{14}{80} = \frac{7}{40}$	**1**
	(d) $P(\text{Led given won}) = \frac{32}{38} = \frac{16}{19}$	**1**
	(e) $P(\text{ result same}) = P(\text{Led and won}) + P(\text{Not lead and lost})$ $= \frac{32}{80} + \frac{28}{80}$ $= \frac{60}{80}$ $= \frac{3}{4}$	**2**