

High School Mathematics Test 2015

Year 8

Further Probability

Non Calculator
Section

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)

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.

1. An event which has a probability of 0.7 could be described as being:
- ☐ certain ☐ impossible ☐ likely ☐ unlikely

2. A player holds 8 cards in his hand, 2 Aces, 3 Kings, 2 Jacks and a Nine.
He draws one card out without looking.

Which of these events would be equally likely?

- ☐ Drawing an Ace and drawing a King.
☐ Drawing an Ace and drawing a Jack.
☐ Drawing a King and drawing a Jack.
☐ Drawing a Jack and drawing a nine.



3. Morgan won the first raffle at the church fete by buying one ticket.
A second raffle is run which has the same number of tickets as the first.
If she buys one ticket in the second raffle, what is the likelihood that she will win it as well?
- ☐ She will have a better chance than she had in the first raffle.
☐ She will have a lesser chance than she had in the first raffle.
☐ She will have the same chance as she had in the first raffle.
☐ She will have no chance of winning the second raffle.

4. A container holds 7 green, 2 yellow and 1 white marbles.
What is the probability of drawing a green marble?

☐ 0.1

☐ 0.2

☐ 0.3

☐ 0.7

5. Lauren's schoolbag contains 2 folders, 4 textbooks, a pencil case and a lunchbox.
One random item falls out of her schoolbag.
What is the probability (as a decimal) that it is a folder?



6. Connor has 70 books in his bookcase.
There are 32 novels, 24 biographies and the rest are textbooks.
He chooses one book at random to read.
What is the probability that it is a textbook?

Questions 7 - 9 refer to the following.

The Tabumal Chamber Orchestra has the following makeup.

Section	Number of players
Brass	10
Keyboards	2
Percussion	6
Strings	30
Woodwind	12



A member of the orchestra is chosen at random to meet the premier after a concert.

7. What is the probability that a percussion player is chosen?

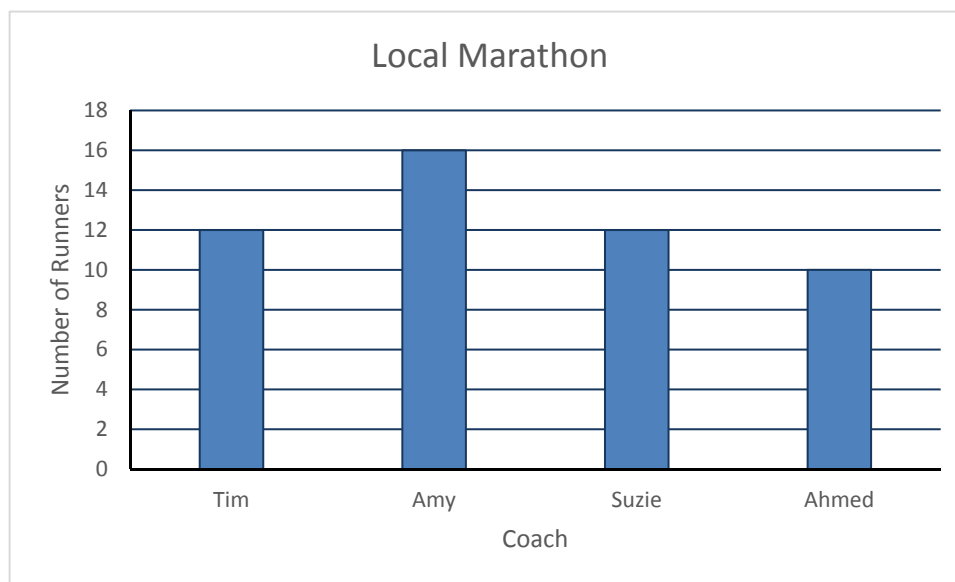
☐ $\frac{1}{10}$
☐ $\frac{1}{6}$
☐ $\frac{1}{5}$
☐ $\frac{1}{2}$

8. What is the probability that a string or brass player is chosen?

9. What is the probability that a woodwind player is *not* chosen?

Questions 10 - 12 refer to the following.

The column graph shows the number of entrants in a local marathon that were trained by four different coaches. Two of the coaches, Tim and Ahmed, are male and two, Amy and Suzie are female.



One person from the marathon is chosen at random to win the entry prize.

10. What is the probability that they were coached by Amy?

☐ $\frac{1}{5}$

☐ $\frac{1}{4}$

☐ $\frac{6}{25}$

☐ $\frac{8}{25}$

11. What is the probability that they were trained by a female?

12. What is the probability that they were not trained by Ahmed?

Questions 13 - 15 refer to the following:

A sample of residents in a block of units answered questions about maintenance.

	Happy with maintenance	Not happy with maintenance	
Owens the unit	4	1	5
Rent the unit	6	9	15
	10	10	20

A resident from the block of units is chosen at random.

13. What is the probability that the resident owns their unit and is happy with maintenance?

☐ $\frac{1}{20}$

☐ $\frac{1}{5}$

☐ $\frac{3}{10}$

☐ $\frac{9}{20}$

14. What is the probability that the resident owns the unit or is happy with maintenance or both?

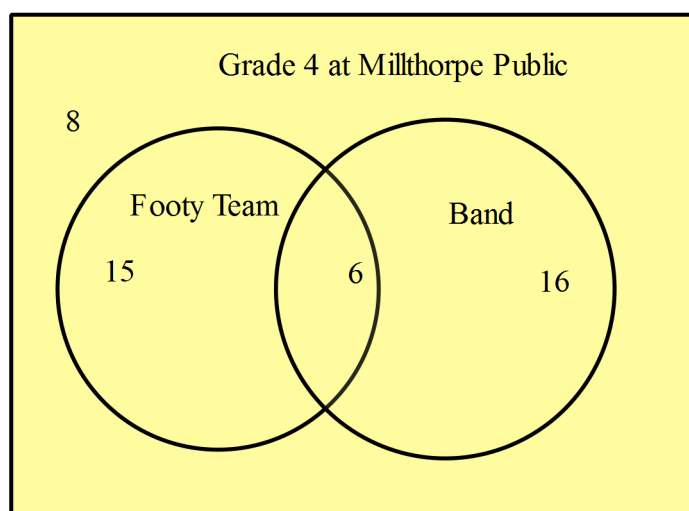
$$\frac{\boxed{}}{\boxed{}}$$

15. What is the probability that a resident who rents their unit is not happy with maintenance?

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

Questions 16 - 18 refer to the following:

The Venn diagram shows some of the characteristics of the students in Grade 4 at Millthorpe Public School.



One of the students is chosen at random.

16. What is the probability that the student is in the band and the footy team?

☐ $\frac{2}{15}$

☐ $\frac{8}{45}$

☐ $\frac{1}{3}$

☐ $\frac{16}{45}$

17. What is the probability that the student is in the footy team or the band but not both?

18. What is the probability that the student is not in the band?

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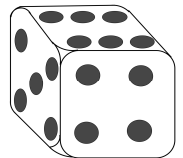
1. What is the probability of rolling a six in a single roll of a normal die?

☐ $\frac{1}{6}$

☐ $\frac{1}{5}$

☐ $\frac{1}{4}$

☐ $\frac{1}{3}$



2. What is the probability of drawing a King from a normal pack of 52 cards?

☐ $\frac{1}{52}$

☐ $\frac{1}{13}$

☐ $\frac{1}{4}$

☐ $\frac{4}{13}$

3. A wardrobe drawer holds 3 tank tops,
6 Tee-shirts and 2 pairs of jeans.

If one item is picked out at random, what is
the probability that it is a tank top?



4. When drawing a single card from a normal pack of 52, which of these events would have a probability of $\frac{1}{2}$?

- ☐ Drawing an ace.
☐ Drawing a club.
☐ Drawing a club or heart.
☐ Drawing a numbered card.

Questions 5 and 6 refer to the following.

The sign for a store called Wellness is made up of boards with one letter written on each as shown below.



One of the boards is chosen at random.

5. What is the probability that it has the letter L on it?

6. What is the probability that it has either of the letters E or N on it?

☐ $\frac{1}{4}$

☐ $\frac{3}{8}$

☐ $\frac{1}{2}$

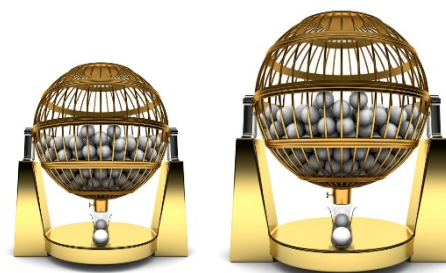
☐ $\frac{5}{8}$

Questions 7 – 8 refer to the following.

In *Powerball*, 6 numbers are drawn from one barrel containing 40 balls, numbered from 1 to 40.

Another ball is drawn from a second barrel containing 20 'Power' Balls numbered from 1 to 20.

In a single game you choose 6 normal numbers and one *Powerball* number.



7. To win you, must match your 6 normal numbers and 1 power ball number with those drawn. How would you describe the probability of winning Powerball when playing one game?

- ☐ likely ☐ unlikely
☐ extremely unlikely ☐ impossible

8. What is the probability that your one Powerball number matches the one drawn?

☐ $\frac{1}{40}$

☐ $\frac{1}{20}$

☐ $\frac{1}{10}$

☐ $\frac{1}{4}$

9. There are 6 lifestyle channels, 12 sports channels and 22 entertainment channels on Lionel's pay TV subscription.

One evening he picks one channel at random to watch.

What is the probability that it is not a sports channel?



☐ $\frac{1}{10}$

☐ $\frac{3}{10}$

☐ $\frac{1}{2}$

☐ $\frac{7}{10}$

Questions 10 – 12 refer to the following.

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

A lucky number board at a fete is numbered from 1 to 100 as shown.

Some numbers are coloured and some are white.

A prize is hidden under one of the numbers.

10. What is the probability that the prize is hidden under a number which is coloured?

☐ 0.05

☐ 0.35

☐ 0.5

☐ 0.65

11. What is the probability that the prize is hidden under an odd number which is coloured?

☐ $\frac{3}{20}$

☐ $\frac{1}{5}$

☐ $\frac{7}{20}$

☐ $\frac{9}{25}$

12. What is the probability that the prize is **not** hidden under a coloured number nor under an odd number?

Questions 13 - 15 refer to the following:

A survey of residences in a housing estate is summarised in the table below.

	House	Unit	Total
Masonry construction	24	48	72
Framed Construction	32	16	48
Total	56	64	120

One of the residences is chosen at random.

13. What is the probability that it is of masonry construction?

☐ $\frac{1}{5}$

☐ $\frac{2}{5}$

☐ $\frac{3}{5}$

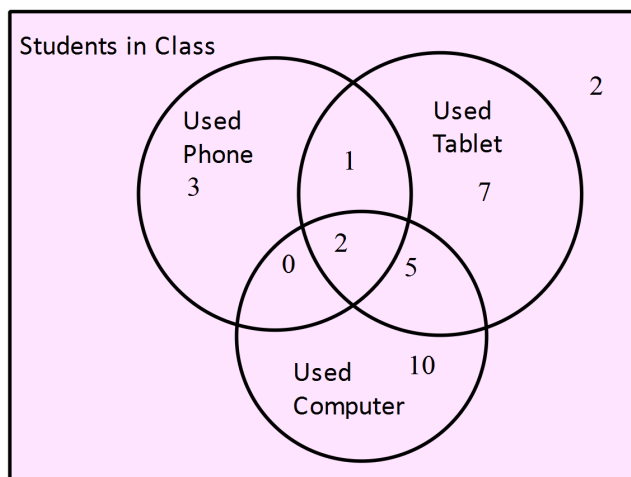
☐ $\frac{2}{3}$

14. What is the probability that it is a unit with a framed construction?

15. What is the probability that the residence is a house, or masonry construction or both?

Questions 16 - 18 refer to the following:

The Venn Diagram summarises what devices students used in researching their History assignment.



A student from year 8 is chosen at random.

16. What is the probability that the student used a computer only?

☐

$\frac{1}{10}$

☐

$\frac{1}{6}$

☐

$\frac{7}{30}$

☐

$\frac{1}{3}$

17. What is the probability that the student used a tablet and a phone?

18. What is the probability that the student used a computer or a tablet but not both?

Year 8

*Further Probability*Non Calculator
Section

ANSWERS

No.	WORKING	ANSWER														
1.	Probability of 0.7 is likely but not certain.	3 rd answer														
2.	Drawing an Ace and drawing a Jack both have a probability of $\frac{2}{10} = \frac{1}{5}$.	2 nd answer														
3.	Winning the first has no effect on her chances in the second.	3 rd answer														
4.	$P(\text{Green}) = \frac{7}{10} = 0.7$	4 th answer														
5.	There are 8 things in the bag $P(\text{Folder}) = \frac{2}{8} = \frac{1}{4} = 0.25$	0.25														
6.	No textbooks = 70- (32+24) = 70 - 56 = 14 $P(\text{Folder}) = \frac{14}{70} = \frac{1}{5}$	$\frac{14}{70}$ or $\frac{1}{5}$														
7.	<table><tr><th>Section</th><th>Number of players</th></tr><tr><td>Brass</td><td>10</td></tr><tr><td>Keyboards</td><td>2</td></tr><tr><td>Percussion</td><td>6</td></tr><tr><td>Strings</td><td>30</td></tr><tr><td>Woodwind</td><td>12</td></tr><tr><td>Total</td><td>60</td></tr></table> $P(\text{Percussion}) = \frac{6}{60} = \frac{1}{10}$	Section	Number of players	Brass	10	Keyboards	2	Percussion	6	Strings	30	Woodwind	12	Total	60	1 st answer
Section	Number of players															
Brass	10															
Keyboards	2															
Percussion	6															
Strings	30															
Woodwind	12															
Total	60															
8.	$P(\text{string or brass}) = \frac{30 + 10}{60} = \frac{40}{60} = \frac{2}{3}$	$\frac{40}{60} = \frac{2}{3}$														
9.	$P(\text{not woodwind}) = \frac{60 - 12}{60} = \frac{48}{60} = \frac{4}{5}$	$\frac{48}{60} = \frac{4}{5}$														

10.	Number of runners = $12+16+12+10 = 50$ $P(\text{Trained by Amy}) = \frac{16}{50} = \frac{8}{25}$	4 th answer
11.	$P(\text{Female}) = P(\text{Amy or Suzie}) = \frac{16+12}{50} = \frac{28}{50} = \frac{14}{25}$	$\frac{28}{50} = \frac{14}{25}$
12.	$P(\text{not Ahmed}) = \frac{50-10}{50} = \frac{40}{50} = \frac{4}{5}$	$\frac{40}{50} = \frac{4}{5}$
13.	$P(\text{Own and Happy}) = \frac{4}{20} = \frac{1}{5}$	2 nd answer
14.	$P(\text{Own or Happy or both}) = \frac{4+6+1}{20} = \frac{11}{20}$	$\frac{11}{20}$
15.	There are 15 who rent, of these, 9 are not happy $P(\text{Unhappy if Rent}) = \frac{9}{15} = \frac{3}{5}$	$\frac{9}{15} = \frac{3}{5}$
16.	Altogether there are $8+15+6+16 = 45$ students $P(\text{Footy and Band}) = \frac{6}{45} = \frac{2}{15}$	1 st answer
17.	$P(\text{Footy or Band not both}) = \frac{15+16}{45} = \frac{31}{45}$	$\frac{31}{45}$
18.	$P(\text{Not in Band}) = \frac{15+8}{45} = \frac{23}{45}$	$\frac{23}{45}$

High School

Mathematics Test 2015

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Further Probability

Calculator Allowed
Short Answer
Section

ANSWERS

No.	WORKING	ANSWER
1.	1 chance in 6 $P(6) = \frac{1}{6}$	1 st answer
2.	4 out of 52 $P(\text{King}) = \frac{4}{52} = \frac{1}{13}$	2 nd answer
3.	There are 11 items $P(\text{Tank}) = \frac{3}{11}$	$\frac{3}{11}$
4.	There are 13 clubs and 13 hears so $P(\text{C or H}) = \frac{26}{52} = \frac{1}{2}$	3 rd answer
5.	There are 8 boards altogether, 2 have L. $P(\text{L}) = \frac{2}{8} = \frac{1}{4}$	$\frac{2}{8} = \frac{1}{4}$
6.	$P(\text{E or N}) = \frac{2+1}{8} = \frac{3}{8}$	2 nd answer
7.	It is extremely unlikely	3 rd answer
8.	You have chosen 1 number, there are 20 possible $P(\text{Match Powerball}) = \frac{1}{20}$	2 nd answer
9.	There are $6 + 12 + 22 = 40$ channels $P(\text{Not Sports}) = \frac{40-12}{40} = \frac{28}{40} = \frac{7}{10}$	4 th answer
10.	There are 35 which are white and 65 are coloured. $P(\text{Coloured}) = \frac{65}{100} = 0.65$	4 th answer

11.	15 odd numbers are coloured. $P(\text{Odd Coloured}) = \frac{15}{100} = \frac{3}{20}$	1 st answer
12.	If it is not under an odd number then it must be under an even number, but all the even numbers are coloured and we want it not under a coloured number. There is no way to do this so $P(\text{Not odd or coloured}) = 0$	0
13.	$P(\text{Masonry}) = \frac{72}{120} = \frac{3}{5}$	3 rd answer
14.	$P(\text{framed unit}) = \frac{16}{120} = \frac{2}{15}$	$\frac{16}{120} = \frac{2}{15}$
15.	$P(\text{house or masonry or both}) = \frac{56 + 48}{120} = \frac{104}{120} = \frac{13}{15}$	$\frac{104}{120} = \frac{13}{15}$
16.	There are 30 student altogether $P(\text{Computer only}) = \frac{10}{30} = \frac{1}{3}$	4 th answer
17.	$P(\text{tablet and phone}) = \frac{3}{30} = \frac{1}{10}$	$\frac{3}{30} = \frac{1}{10}$
18.	$P(\text{computer or tablet not both}) = \frac{10 + 0 + 1 + 7}{30} = \frac{18}{30} = \frac{3}{5}$	$\frac{18}{30} = \frac{3}{5}$