School Name
Mathematics Test 2017

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. Calculators are **not** allowed.

1. An event which is described as "extremely unlikely" could have a probability of:

   ☐ 0.005 ☐ 0.1 ☐ 0.5 ☐ 0.995

2. Which of these events has a "very likely" chance of occurring?

   ☐ Drawing a Queen from a normal pack of cards.

   ☐ Drawing a Heart from a normal pack of cards.

   ☐ Rolling a number more than Six on a normal die.

   ☐ Rolling a number less than Six on a normal die.

3. One thousand tickets are sold in a raffle. If you purchase 5 tickets, what are your chances of winning the raffle?

   ☐ $\frac{1}{1000}$ ☐ $\frac{1}{995}$ ☐ $\frac{1}{200}$ ☐ $\frac{1}{50}$

4. A letter is chosen at random from those in the word UNDERSTAND.

   What is probability that it is a vowel?

   ☐ 0.25 ☐ 0.3 ☐ 0.35 ☐ 0.4

5. The pin container on Lucy's desk contains 21 blue pins, 12 red pins, 34 green pins and 33 yellow pins.

She picks up one pin without looking.

What is the probability (as a decimal) that it is a blue pin?

.

6. Matthew places 12 cards labelled 1 to 12 into a hat.

He chooses one card at random from the hat.

What is the probability of selecting the cards labelled 2, 3 or 4?

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

7. Which of these pairs of events would be equally likely?

- ☐ Drawing an Ace and not drawing an Ace from a normal pack of cards.
- ☐ Drawing a Diamond and not drawing a Diamond from a normal pack of cards.
- ☐ Rolling a Six and not rolling a Six on a normal die.
- ☐ Landing a Head and not landing a Head in a toss of a normal coin.

Questions 8 - 9 refer to the following.

There are five vessels boarding passengers from wharves on a river one afternoon.

The numbers that board each vessel are listed below.

Vessel	Number of Passengers
SS Perth	250
MV Shelley	180
MV Phillip	200
MV Swan	320
SS Fremantle	50

One passenger is chosen at random from those above.

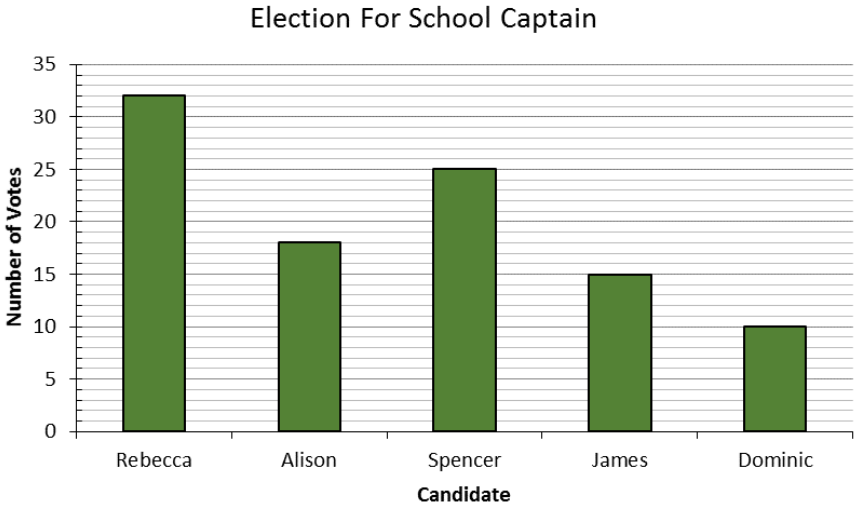
8. What is the probability that a passenger from the MV Phillip is chosen?

☐ $\frac{1}{8}$ ☐ $\frac{1}{5}$ ☐ $\frac{1}{4}$ ☐ $\frac{1}{2}$

9. What is the probability that a passenger from the SS Perth or SS Fremantle is chosen?

Questions 10 – 12 refer to the following.

The graph below shows the number of votes received by the five candidates for School Captain.



One person who voted in the election is chosen at random.

10. What is the probability that they voted for Spencer?

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

11. What is the probability that they voted for a male?

12. What is the probability that they did not vote for Rebecca?

Questions 13 - 15 refer to the following:

A survey compared satisfaction by customers buying flat pack wardrobes, versus finished wardrobes.

	Satisfied	Not Satisfied	
Flat Pack Wardrobe	16	4	20
Finished Wardrobe	25	5	30
	41	9	50

13. One of the customers who took part in the survey is chosen at random.

What is the probability that the person bought a flat pack and was satisfied with it?

☐ $\frac{8}{25}$ ☐ $\frac{16}{41}$ ☐ $\frac{16}{25}$ ☐ $\frac{41}{50}$

14. One of the customers who took part in the survey is chosen at random.

What is the probability that the person was not satisfied with their purchase?

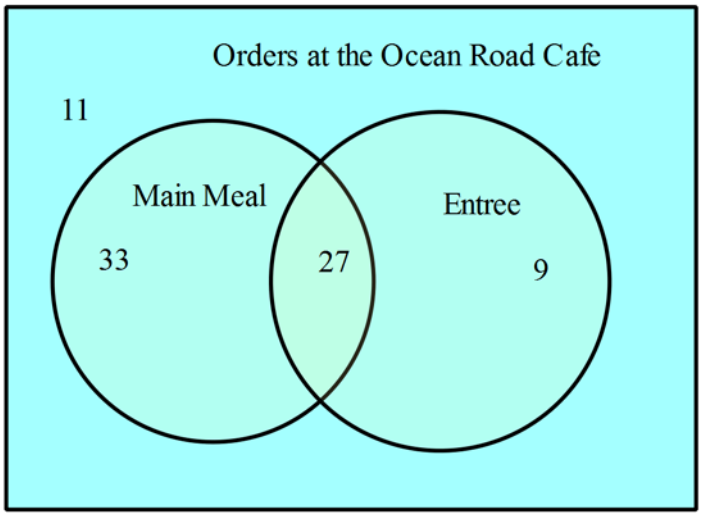
$\square$

15. If a person who bought a finished wardrobe is chosen at random, what is the probability that they were satisfied?

$\square$

Questions 16 - 18 refer to the following:

The Venn diagram shows the meals orders of customers at the Ocean Road Café on one evening.



16. One of the customers is chosen at random.

What is the probability that the customer ordered a main meal and an entree?

☐ $\frac{9}{80}$ ☐ $\frac{9}{69}$ ☐ $\frac{27}{80}$ ☐ $\frac{27}{80}$

17. One of the customers is chosen at random.

What is the probability that the customer ordered a main meal, but no entree?

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

18. What is the probability that the customer did not order an entree?

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

School Name

Mathematics Test 2017

Further Probability

Year 8

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 this test paper. Calculators are allowed.

1. What is the probability of drawing King or Queen from a normal pack of 52 cards?

☐ $\frac{1}{52}$ ☐ $\frac{1}{13}$ ☐ $\frac{2}{13}$ ☐ $\frac{4}{13}$

2. What is the probability of rolling a number less than 5 in a single roll of a normal die?

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

3. Zane has 4 jumpers, 3 rugby tops and 7 T-shirts returned from being washed.
He tosses them into an empty drawer and then picks one out at random.
What is the probability that it is a rugby top?

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

4. When drawing a single card from a normal pack of 52, which of these events would have a probability of $\frac{3}{4}$?

- ☐ Drawing a 7, 8 or 9.
- ☐ Drawing a King, Queen or Jack.
- ☐ Drawing an Ace, 2 or 3.
- ☐ Drawing a club, spade or heart.

Questions 5 and 6 refer to the following.

Elizabeth empties out the coins from her purse. They are shown below.

She mixes them up and chooses one coin at random.

5. What is the probability that it is a 5c coin?

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

6. What is the probability that it is either a 50c or 20c coin?

☐ $\frac{1}{4}$ ☐ $\frac{1}{2}$ ☐ $\frac{5}{8}$ ☐ $\frac{5}{7}$

7. What is the probability that it is not a 10c coin?

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

8. The eleven people on a rafting trip wear coloured helmets.

Two of the helmets are white, three are black and the rest are blue.

If one person is chosen at random, what is the probability that their helmet is not blue?

☐ $\frac{5}{11}$ ☐ $\frac{6}{11}$ ☐ $\frac{8}{11}$ ☐ $\frac{9}{11}$

Questions 9 – 11 refer to the following.

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	U
V	W	X	Y	Z	*	#

In a board game, the letters of the alphabet are written on 26 cards and a further two cards have symbols instead of letters.

Some of the cards are grey and some are white.

The cards are shuffled and one is chosen at random.

9. What is the probability that the card which is drawn, is a grey card?

☐ $\frac{12}{28}$ ☐ $\frac{13}{28}$ ☐ $\frac{15}{28}$ ☐ $\frac{13}{15}$

10. What is the probability that the card drawn has a vowel and is coloured grey?

☐ 0 ☐ $\frac{5}{13}$ ☐ $\frac{5}{28}$ ☐ 1

11. What is the probability that the card has a one of the first six letters of the alphabet or a symbol?

☐
☐

Questions 12 - 14 refer to the following:

The works of two artists make up an exhibition at a gallery.

The makeup of the exhibition is summarised in the table below.

Artist	Painting	Sculpture	Total
Juniper	33	12	45
Lindsay	28	7	35
Total	61	19	80

One of the artworks is chosen at random.

12. What is the probability that it is by Juniper?

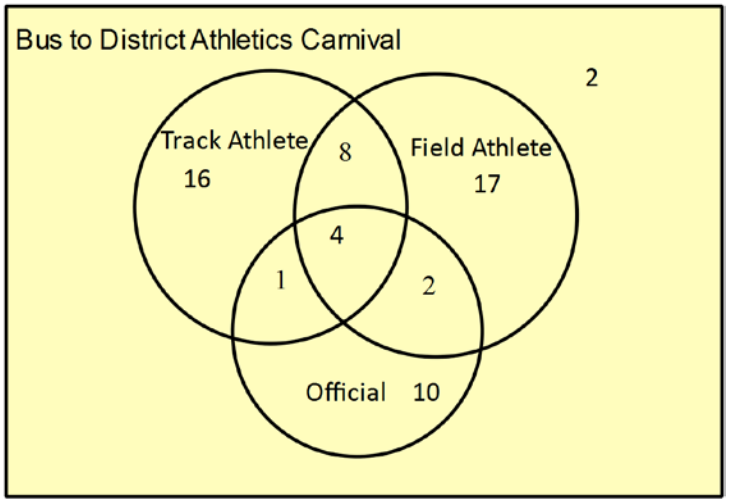
☐ $\frac{7}{80}$ ☐ $\frac{19}{80}$ ☐ $\frac{9}{16}$ ☐ $\frac{17}{20}$

13. What is the probability that it is a sculpture by Lindsay? $\square/\square$

14. What is the probability that it is by Lindsay, is a painting, or both? $\square/\square$

Questions 15 - 18 refer to the following:

The Venn Diagram summarises the roles of those on the bus to the district athletics carnival.



A person on the bus is chosen at random.

15. What is the probability that the person was both a track and a field athlete?

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

16. What is the probability that the person was not a field athlete?

☐ $\frac{17}{60}$ ☐ $\frac{9}{20}$ ☐ $\frac{29}{60}$ ☐ $\frac{31}{60}$

17. What is the probability that the person was a track athlete, but not an official? $\square/\square$

18. If we know that the person selected is an athlete, what is the probability that they were also an official? $\square/\square$

School Name
Mathematics Test 2017

Year 8 **Further Probability** Non Calculator Section

ANSWERS

Question	Working and Answer
1.	"Extremely unlikely" has a very low probability, so 0.005 is the best answer. **1st Answer**
2.	"Very likely" indicates a high probability (greater than ½) He four choices have probabilities of $\frac{1}{13}$, $\frac{1}{4}$, 0 and $\frac{5}{6}$ respectively. Only the last one is very likely. **4th Answer**
3.	$P(\text{Win}) = \frac{5}{1000} = \frac{1}{200}$ **3rd Answer**
4.	$P(\text{Vowel}) = \frac{3}{10} = 0.3$ **2nd Answer**
5.	There are 100 pins in the container $P(\text{Blue}) = \frac{21}{100} = \mathbf{0.21}$
6.	$P(2, 3 \text{ or } 4) = \frac{3}{12} = \mathbf{\frac{1}{4}}$

<table>
<tr><th>Question</th><th>Working and Answer</th></tr>
<tr><td>7.</td><td>Pairs of probabilities are
$\frac{1}{13}$ and $\frac{12}{13}$
$\frac{1}{4}$ and $\frac{3}{4}$
$\frac{1}{6}$ and $\frac{5}{6}$
$\frac{1}{2}$ and $\frac{1}{2}$
Only the last pair are equally likely
4th Answer</td></tr>
<tr><td>8.</td><td><table><tr><th>Vessel</th><th>Number of Passengers</th></tr><tr><td>SS Perth</td><td>250</td></tr><tr><td>MV Shelley</td><td>180</td></tr><tr><td>MV Phillip</td><td>200</td></tr><tr><td>MV Swan</td><td>320</td></tr><tr><td>SS Fremantle</td><td>50</td></tr><tr><td>Total</td><td>1000</td></tr></table>$P(\text{Phillip}) = \frac{200}{1000} = \frac{1}{5}$
2nd Answer</td></tr>
<tr><td>9.</td><td>$P(\text{Perth or Fremantle}) = \frac{250 + 50}{1000} = \frac{300}{1000} = \mathbf{\frac{3}{10}}$</td></tr>
<tr><td>10.</td><td>Number of runners = 32+18+25+15+10 = 100
$P(\text{Voted for Spencer}) = \frac{25}{100} = \frac{1}{4}$
2nd Answer</td></tr>
<tr><td>11.</td><td>$P(\text{Male}) = P(\text{Spencer, James or Dominic}) = \frac{25 + 15 + 10}{100} = \frac{50}{100} = \mathbf{\frac{1}{2}}$</td></tr>
<tr><td>12.</td><td>$P(\text{not Rebecca}) = \frac{100 - 32}{100} = \mathbf{\frac{68}{100}} = \mathbf{\frac{17}{25}}$</td></tr>
</table>

Question	Working and Answer
13.	$P(\text{Flat and Satisfied}) = \frac{16}{50} = \frac{8}{25}$ **1st Answer**
14.	$P(\text{Not satisfied}) = \mathbf{\frac{9}{50}}$
15.	There are 30 who bought finished wardrobes, of these, 25 are satisfied $P(\text{Satisfied given Finished}) = \frac{25}{30} = \mathbf{\frac{5}{6}}$
16.	Altogether there are 11 + 33 + 27 + 9 = 80 customers $P(\text{Main and entree}) = \frac{27}{80}$ **3rd Answer**
17.	$P(\text{Main no entree}) = \mathbf{\frac{33}{80}}$
18.	$P(\text{No Entree}) = \frac{11 + 33}{80} = \mathbf{\frac{44}{80}} = \mathbf{\frac{11}{20}}$

School Name
Mathematics Test 2017

Further Probability

Year 8

Calculator Allowed
Short Answer
Section

ANSWERS

Question	Working and Answer
1.	4 K and 4 Q out of 52 $P(\text{K or Q}) = \frac{8}{52} = \frac{2}{13}$ **3rd Answer**
2.	4 are less than 5 $P(\text{Less thasn 5}) = \frac{4}{6} = \frac{2}{3}$ **3rd Answer**
3.	There are 14 tops $P(\text{Rugby}) = \mathbf{\frac{3}{14}}$
4.	There are 4 of each type of card out of 52, so first 3 options have a probability of $\frac{12}{52} = \frac{3}{13}$ There are 13clubs, 13 hearts and 13 spades so $P(\text{H, C or S}) = \frac{39}{52} = \frac{3}{4}$ **4th Answer**
5.	There are 10 coins altogether, 2 are 5c $P(\text{5c}) = \frac{2}{10} = \mathbf{\frac{1}{5}}$

6.	$P(\text{50c or 20c}) = \frac{2+3}{10} = \frac{5}{10} = \frac{1}{2}$ **2nd Answer**
7.	$P(\text{Not a 10c}) = \frac{10-3}{10} = \mathbf{\frac{7}{10}}$
8.	$P(\text{Not Blue}) = \frac{2+3}{11} = \frac{5}{11}$ **1st Answer**
9.	There are 28 cards and 13 are grey. $P(\text{Grey}) = \frac{13}{28}$ **2nd Answer**
10.	All of the vowels are on white cards. $P(\text{Vowel and Grey}) = \frac{0}{28} = 0$ **1st Answer**
11.	6 letters and 2 symbols gives 8 cards $P(\text{1st six letters or symbol}) = \frac{8}{28} = \mathbf{\frac{2}{7}}$
12.	$P(\text{Juniper}) = \frac{45}{80} = \frac{9}{16}$ **3rd Answer**
13.	$P(\text{Lindsay Sculpture}) = \mathbf{\frac{7}{80}}$
14.	$P(\text{Lindsay or Painting or Both}) = (28 + 7 + 33) = \mathbf{\frac{68}{80}} = \mathbf{\frac{17}{20}}$
15.	There are 60 people altogether $P(\text{Track and Field}) = \frac{8+4}{60} = \frac{12}{60} = \frac{1}{5}$ **2nd Answer**

16.	$P(\text{Field}) = \frac{31}{60}$ $P(\text{Not Field}) = 1 - \frac{31}{60} = \frac{29}{60}$ **3rd Answer**
17.	$P(\text{Track not Official}) = \frac{16+8}{60} = \frac{24}{60} = \mathbf{\frac{2}{5}}$
18.	Number of Athletes = 16 + 8 + 4 + 1 + 17 + 2 $P(\text{Official given Athlete}) = \frac{1+4+2}{48} = \mathbf{\frac{7}{48}}$