High School Mathematics Test 2014

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(es) 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. To play a Lotto game, you select six numbers and you win if they are the same six numbers that are drawn out from a barrel containing forty numbers.
How would you describe the probability of winning Lotto when playing one game?

☐ likely ☐ unlikely

☐ extremely unlikely ☐ impossible

2. What is the probability of rolling a five in a single roll of a normal die?

☐ $\frac{1}{6}$ ☐ $\frac{1}{5}$ ☐ $\frac{1}{3}$ ☐ $\frac{1}{2}$

3. A lollie jar holds 24 caramels, 16 licorice and 10 toffees.
If one lollie is picked out at random, what is the probability that it is a caramel?

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

4. Which of these events would have a probability of 1?

☐ Drawing an ace from a normal pack.

☐ Drawing a club or diamond from a normal pack.

☐ Rolling a number more than1 on a normal die.

☐ Rolling a number less than 7 on a normal die.

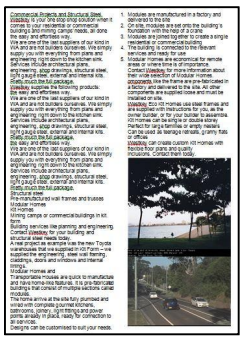
5. One card is chosen at random from those shown.

E	X	C	E	L	L	E	N	C	E

What is the probability that it is the letter L? ☐/☐

6. There are 16 free to air channels and 20 pay channels on Warren's TV.
On evening he picks one channel at random to watch.
What is the probability that it is a pay channel? ☐/☐

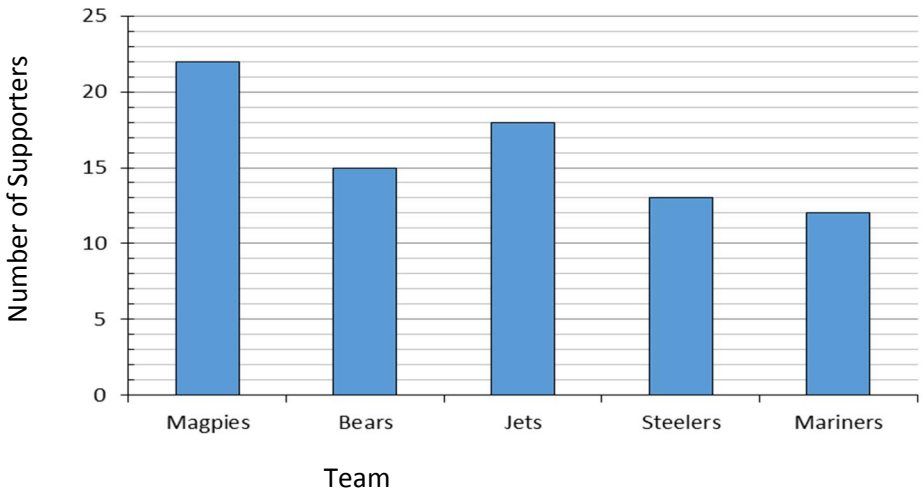
7. Jessie places the page shown on a table and places his model car on the page to paint it. Where are the trickles of paint more likely to fall?



- ☐ They are more likely to fall on an image.
- ☐ They are more likely to fall on text.
- ☐ It is equally likely that they will fall on an image or on text.
- ☐ It depends where the model car is placed on the page and how large it is.

Questions 9 and 10 refer to the following.

The results of a survey on the supporters of the local football teams are shown in the graph.



8. If one person were chosen at random, what is the probability that they supported the Magpies or the Bears? ☐/☐

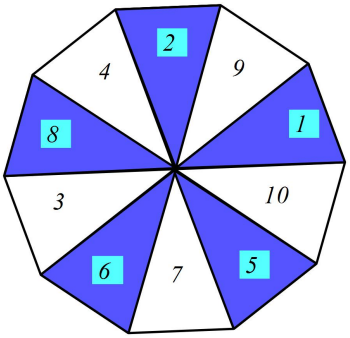
9. If one person were chosen at random, what is the probability that they did not support the Jets?

$\square$ / $\square$

Questions 9 and 10 refer to the following.

A spinner has ten equal sectors numbered 1 to 10 as shown.

Five sectors are coloured and five are white.



10. What is the probability of the spinner landing on a sector which is coloured and even numbered?

☐ $\frac{3}{10}$ ☐ $\frac{1}{2}$ ☐ $\frac{3}{5}$ ☐ $\frac{7}{10}$

11. What is the probability of the spinner landing on a sector that is even numbered or white (or both)?

☐ $\frac{1}{5}$ ☐ $\frac{3}{10}$ ☐ $\frac{7}{10}$ ☐ $\frac{4}{5}$

12. A police report indicates that in a certain city, 45% of the crimes reported were for stealing, 11% were for assault, 13% were for property damage and the remainder were a variety of crimes.

What is the probability that a crime reported will be either an assault or property damage?

☐ 0.11 ☐ 0.13 ☐ 0.24 ☐ 0.35

Questions 13 - 15 refer to the following:

A survey of phone ownership in year 8 is summarised in the table below.

	Owns phone	Does not own phone	Total
Male	36	15	51
Female	42	7	49
Total	78	22	100

A student is chosen at random from year 8.

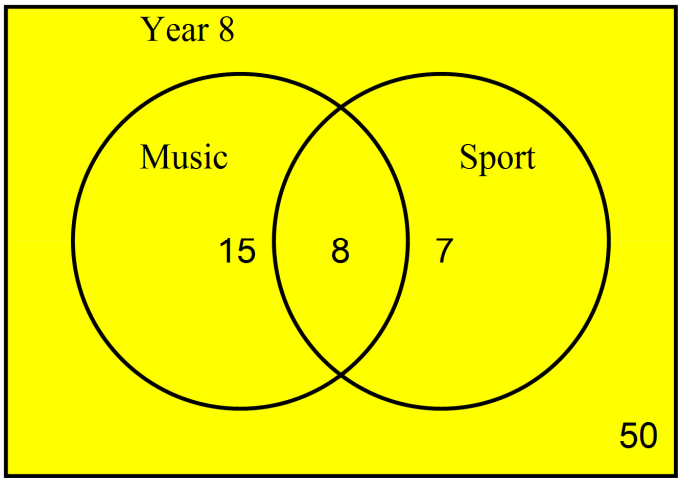
13. What is the probability that the student is female?

☐ $\frac{7}{22}$ ☐ $\frac{49}{100}$ ☐ $\frac{51}{100}$ ☐ $\frac{7}{13}$

14. What is the probability that the student is a male who owns a phone?

15. What is the probability that the student owns a phone or is female, but not both?

Questions 16 - 18 refer to the following:
The Venn Diagram summarises the number of students from year 8 who represented the school in sport or music.



A student from year 8 is chosen at random.

16. What is the probability that the student represented in sport?

☐ $\frac{7}{80}$ ☐ $\frac{3}{16}$ ☐ $\frac{3}{10}$ ☐ $\frac{7}{8}$

17. What is the probability that the student represented in sport and music?

18. What is the probability that the student represented in sport or music or both?

High School Mathematics Test 2014

Year 8

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(es) 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. An event which is impossible would have a probability of:

   ☐ 0 ☐ 0.1 ☐ 0.5 ☐ 1

2. A bag contains 10 tickets, numbered 1 to 10.
   Which of these events would have a probability of 0.5?

   ☐ Drawing a 1.
   ☐ Drawing a number less than 9.
   ☐ Drawing an even number.
   ☐ Drawing a number less than 5.

3. A bag contains 1 red, 2 blue and 7 white marbles.
   What is the probability of drawing a white marble?

   ☐ 0.1 ☐ 0.2 ☐ 0.3 ☐ 0.7

4. Cameron flipped a coin 15 times and each time a tail showed. What is the probability that a tail will show on the 16^{th} toss?

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

5. Zoe's toolbox contains 12 screwdrivers, 10 spanners and 3 saws.
   Zoe picks a single tool from the toolbox at random.
   What is the probability that it is not a screwdriver?

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

6. Duane has 90 songs by female artists, 135 songs by male artists and 75 songs by groups on his phone.
He chooses one song at random to play.
What is the probability (as a decimal) that it is by a group?

.

Questions 7 - 9 refer to the following.
The table shows the jobs held by the production staff in a Computer Games company.

Job	Number of staff
Animators	40
Designers	20
Programmers	50
Other	10
Total	120

A member of the production staff is chosen at random to attend a meeting.

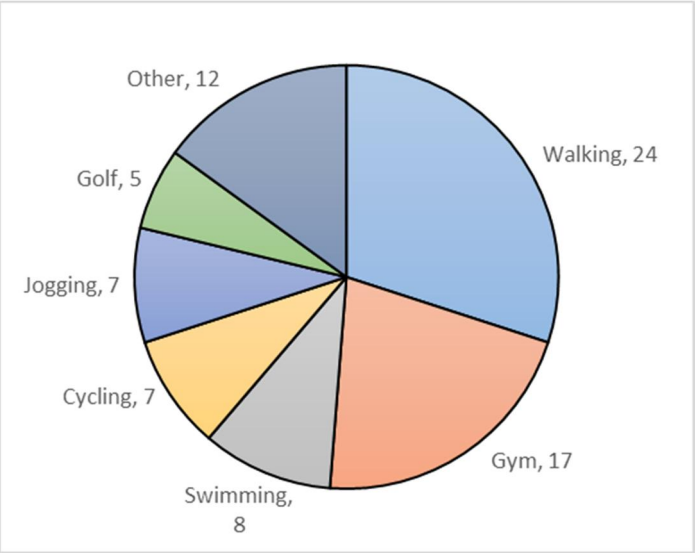
7. What is the probability that they are not a designer?

☐ 0.17 ☐ 0.2 ☐ 0.8 ☐ 0.83

8. What is the probability that they are an animator or programmer?

9. What is the probability that they are not a designer or an animator?

Questions 10 - 12 refer to the following.
The sector graph shows the results of a survey on participation in physical activities.
For each activity the number of people who selected the activity is shown.



A person who does physical activity is chosen at random.

10. What is the probability that they do not do walking?

☐ 0.3 ☐ 0.5 ☐ 0.66 ☐ 0.7

11. What is the probability that they do cycling or jogging?

12. What is the probability that they do not do swimming or gym?

Questions 13 - 15 refer to the following:
A sample of residents in a suburb took part in a survey about driving and car ownership.

	Has drivers licence	Does not have drivers licence	
Owns car	75	5	80
Does not own car	48	12	60
	123	17	140

A resident from the suburb is chosen at random.

13. What is the probability that the resident owns a car and has a licence?

☐ $\frac{12}{35}$ ☐ $\frac{15}{28}$ ☐ $\frac{16}{25}$ ☐ $\frac{75}{123}$

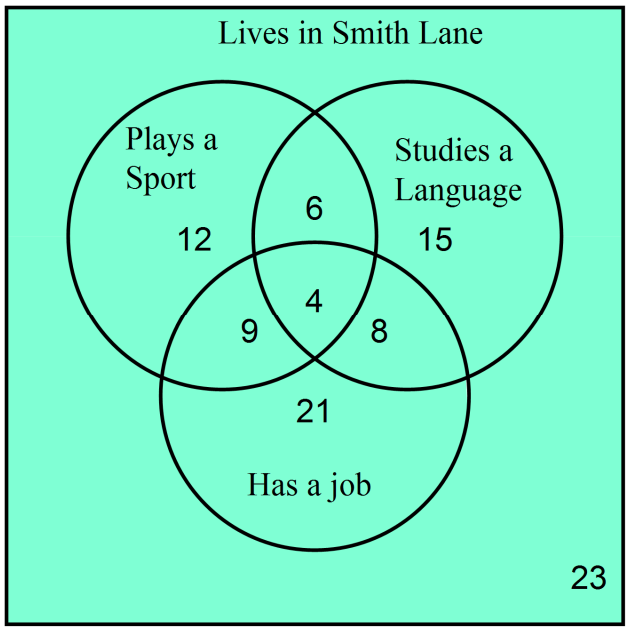
14. What is the probability that the resident owns a car or has a licence or both?

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

15. What is the probability that the resident owns a car but does not have a licence?

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

Questions 16 - 18 refer to the following:
The Venn diagram shows some of the characteristics of the residents of Smith Lane.



A resident of Smith Lane is chosen at random.

16. What is the probability that the resident has a job and studies a language?

☐ $\frac{3}{14}$ ☐ $\frac{27}{98}$ ☐ $\frac{6}{49}$ ☐ $\frac{2}{7}$

17. What is the probability that the resident plays a sport or studies a language but not both?

$\square$

18.	What is the probability that the resident does not have a job but plays a sport and studies a language? 

High School
Mathematics Test 2014

Further Probability
ANSWERS

Non Calculator Section (1 mark each)

1. To play a Lotto game, you select six numbers and you win if they are the same six numbers that are drawn out from a barrel containing forty numbers.
How would you describe the probability of winning Lotto when playing one game?

- ☐ likely
- ☐ unlikely
- ■ extremely unlikely
- ☐ impossible

2. What is the probability of rolling a five in a single roll of a normal die?

- ■ $\frac{1}{6}$
- ☐ $\frac{1}{5}$
- ☐ $\frac{1}{3}$
- ☐ $\frac{1}{2}$

3. A lollie jar holds 24 caramels, 16 licorice and 10 toffees.
If one lollie is picked out at random, what is the probability that it is a caramel?

$\frac{24}{50} = \frac{12}{25}$

4. Which of these events would have a probability of 1?

- ☐ Drawing an ace from a normal pack.
- ☐ Drawing a club or diamond from a normal pack.
- ☐ Rolling a number more than1 on a normal die.
- ■ Rolling a number less than 7 on a normal die.

5. One card is chosen at random from those shown.

E	X	C	E	L	L	E	N	C	E

What is the probability that it is the letter L?

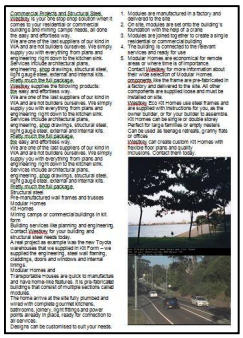
$\frac{2}{10} = \frac{1}{5}$

6. There are 16 free to air channels and 20 pay channels on Warren's TV. On evening he picks one channel at random to watch.

What is the probability that it is a pay channel?

$$\frac{20}{36} = \frac{5}{9}$$

7. Jessie places the page shown on a table and places his model car on the page to paint it. Where are the trickles of paint more likely to fall?



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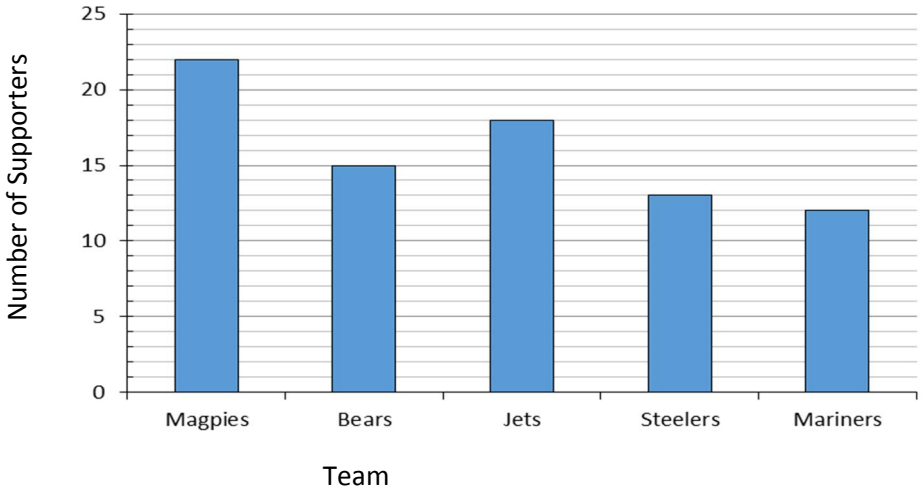

8. If one person were chosen at random, what is the probability that they supported the Magpies or the Bears?

$$\frac{22 + 15}{80} = \frac{37}{80}$$

9. If one person were chosen at random, what is the probability that they did not support the Jets?

$$p(\text{not Jets}) = 1 - \frac{18}{80} = \frac{62}{80} = \frac{31}{40}$$

Questions 9 and 10 refer to the following.

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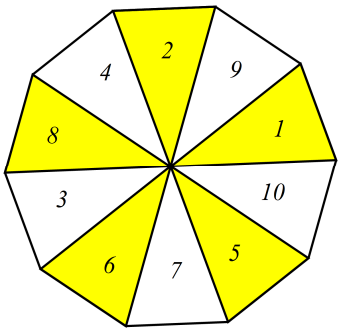

10. What is the probability of the spinner landing on a sector which is coloured and even numbered?

■ $\frac{3}{10}$ ☐ $\frac{1}{2}$ ☐ $\frac{3}{5}$ ☐ $\frac{7}{10}$

11. What is the probability of the spinner landing on a sector that is even numbered or white (or both)?

☐ $\frac{1}{5}$ ☐ $\frac{3}{10}$ ☐ $\frac{7}{10}$ ■ $\frac{4}{5}$

12. A police report indicates that in a certain city, 45% of the crimes reported were for stealing, 11% were for assault, 13% were for property damage and the remainder were a variety of crimes.

What is the probability that a crime reported will be either an assault or property damage?

☐ 0.11 ☐ 0.13 ■ 0.24 ☐ 0.35

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A student is chosen at random from year 8.

13. What is the probability that the student is female?

☐ $\frac{7}{22}$ ■ $\frac{49}{100}$ ☐ $\frac{51}{100}$ ☐ $\frac{7}{13}$

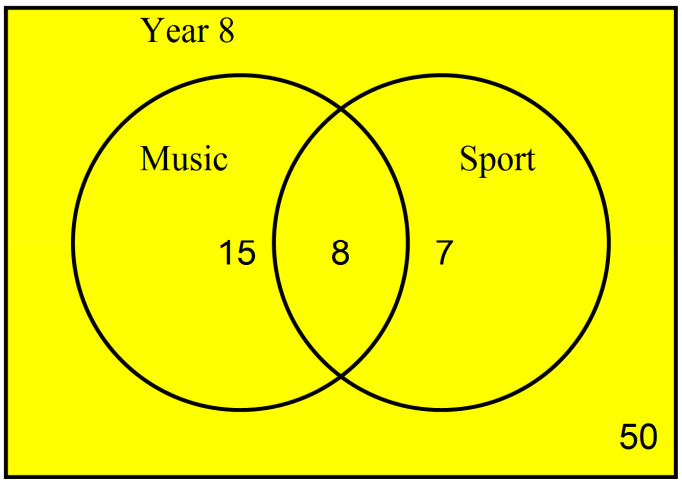
14. What is the probability that the student is a male who owns a phone?

0.36 $= \frac{36}{100} = \frac{9}{25}$

15. What is the probability that the student owns a phone or is female, but not both?

$\frac{7+36}{100}$ **0.43** $= \frac{43}{100}$

Questions 16 - 18 refer to the following:
The Venn Diagram summarises the number of students from year 8 who represented the school in sport or music.



A student from year 8 is chosen at random.

16. What is the probability that the student represented in sport?

☐ $\frac{7}{80}$ ■ $\frac{3}{16}$ ☐ $\frac{3}{10}$ ☐ $\frac{7}{8}$

17. What is the probability that the student represented in sport and music?

$\frac{8}{80} = \frac{1}{10} =$ **0.1**

18. What is the probability that the student represented in sport or music or both?

$\frac{30}{80} = \frac{3}{8}$ **0.375**

High School
Mathematics Test 2014

Calculator Allowed Short Answer Section (1 mark each)

1. An event which is impossible would have a probability of:

■ 0 ☐ 0.1 ☐ 0.5 ☐ 1

2. A bag contains 10 tickets, numbered 1 to 10.
Which of these events would have a probability of 0.5?

☐ Drawing a 1.

☐ Drawing a number less than 9.

■ Drawing an even number.

☐ Drawing a number less than 5.

3. A bag contains 1 red, 2 blue and 7 white marbles.
What is the probability of drawing a white marble?

☐ 0.1 ☐ 0.2 ☐ 0.3 ■ 0.7

4. Cameron flipped a coin 15 times and each time a tail showed. What is the probability that a tail will show on the 16th toss?

$\frac{1}{2}$

5. Zoe's toolbox contains 12 screwdrivers, 10 spanners and 3 saws.
Zoe picks a single tool from the toolbox at random.
What is the probability that it is not a screwdriver?

$\frac{13}{25}$

6. Duane has 90 songs by female artists, 135 songs by male artists and 75 songs by groups on his phone.
He chooses one song at random to play.
What is the probability (as a decimal) that it is by a group?

$\frac{75}{300} =$ 0.25

Questions 7 - 9 refer to the following.
The table shows the jobs held by the production staff in a Computer Games company.

Job	Number of staff
Animators	40
Designers	20
Programmers	50
Other	10
Total	120

A member of the production staff is chosen at random to attend a meeting.

7. What is the probability that they are not a designer?

☐ 0.17 ☐ 0.2 ☐ 0.8 ■ 0.83

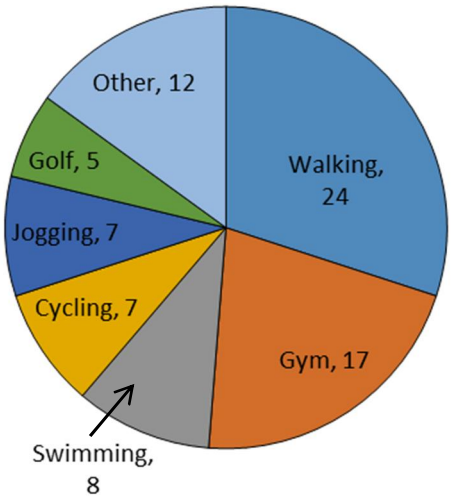
8. What is the probability that they are an animator or programmer?

0.75 $= \frac{3}{4}$

9. What is the probability that they are not a designer or an animator?

$1 - \frac{60}{120} = 1 - \frac{1}{2} = \frac{1}{2}$ 0.5

Questions 10 - 12 refer to the following.
The sector graph shows the results of a survey on participation in physical activities.
For each activity the number of people who selected the activity is shown.



A person who does physical activity is chosen at random.

10. What is the probability that they do not do walking?

☐ 0.3 ☐ 0.5 ☐ 0.66 ■ 0.7

11. What is the probability that they do cycling or jogging?

$\frac{14}{80} = \frac{7}{40} =$ 0.175

12. What is the probability that they do not do swimming or gym?

$1 - \frac{8 + 17}{80} = \frac{11}{16} =$ 0.6875

Questions 13 - 15 refer to the following:
A sample of residents in a suburb took part in a survey about driving and car ownership.

	Has drivers licence	Does not have drivers licence	
Owns car	75	5	80
Does not own car	48	12	60
	123	17	140

A resident from the suburb is chosen at random.

13. What is the probability that the resident owns a car and has a licence?

☐ $\frac{12}{35}$ ■ $\frac{15}{28}$ ☐ $\frac{16}{25}$ ☐ $\frac{75}{123}$

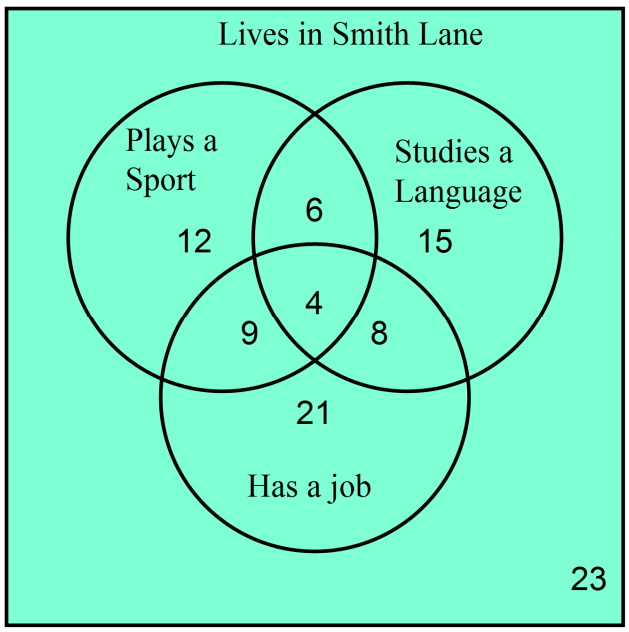
14. What is the probability that the resident owns a car or has a licence or both?

$\frac{75 + 5 + 48}{140} = \frac{32}{35}$ $\frac{32}{35}$

15. What is the probability that the resident owns a car but does not have a licence?

$\frac{5}{140} =$ $\frac{1}{28}$

Questions 16 - 18 refer to the following:
The Venn diagram shows some of the characteristics of the residents of Smith Lane.



A resident of Smith Lane is chosen at random.

16. What is the probability that the resident has a job and studies a language?

☐ $\frac{3}{14}$ ☐ $\frac{27}{98}$ ■ $\frac{6}{49}$ ☐ $\frac{2}{7}$

17. What is the probability that the resident plays a sport or studies a language but not both?

$\frac{44}{98} =$ $\frac{22}{49}$

18. What is the probability that the resident does not have a job but plays a sport and studies a language?

$\frac{6}{98}$ $\frac{3}{49}$