EPIDEMIC

Twenty per cent of the inhabitants of a city have been inoculated against a certain disease. A city is hit by an epidemic. The chance of infection amongst those inoculated is 10% but amongst the rest it is 75%.

Copy and fill in the contingency table and the Venn diagram below and use them to answer the questions.

1. a. In the contingency table, split the 20% who are inoculated into the percentages who get infected and the percentages who are not affected (remain immune).

b. Split the 80% who are not inoculated into three quarters who get infected and one quarter who are not infected (who remain immune).

c. Fill in the totals in the right hand column.

2. What proportion are infected?

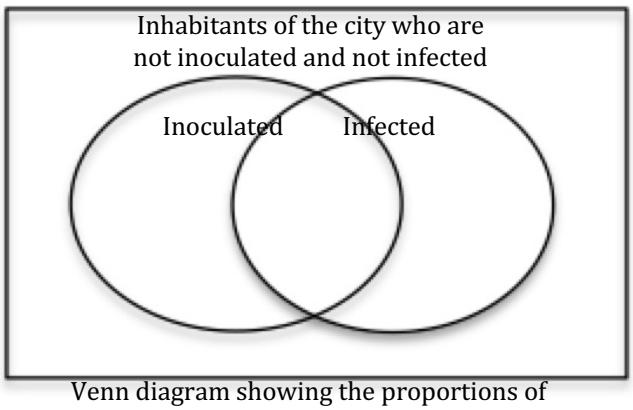
3. If a man is chosen at random and found to be infected, what is the chance of his having been inoculated?

	Inoculated	Not inoculated	Totals
Infected			
Not infected			
Totals	20%	80%	100%

Note: fractions, decimals and percentages are 3 alternative ways of writing the same number.

This example refers to proportions of the population not to actual numbers.

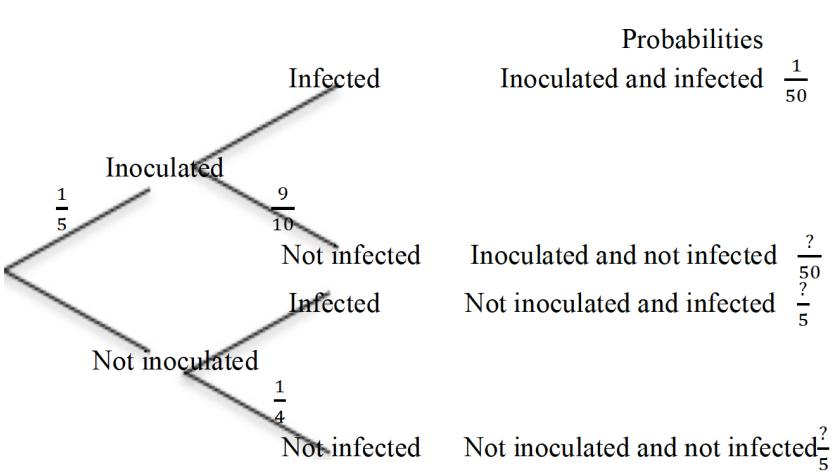
Sometimes fractions are convenient, but we often use decimals for calculations.



Venn diagram showing the proportions of inoculated or infected people in the city.

4. Complete this Venn diagram, and also complete the tree diagram below.

The contingency table, Venn diagram and tree diagram give the same information in different ways.



Fill in the given percentages as fractions, and to show the probabilities of an individual chosen at random from the population being inoculated or not inoculated, and being infected or not infected.

5. The chance of an infected person having been inoculated is $\frac{1}{50}/\frac{31}{50} = \frac{1}{31}$.

What is the chance of a person not infected having been inoculated?

HELP

If possible work in a group where different people bring different experience, skills and knowledge to contribute to the group discussion. Talk to other people about this problem but aim for everyone to help everyone else.

There is much talk in the media about the corona virus. Some of what you hear is inaccurate and misleading. For example, when people speak of 'safe' they should often say 'lower risk' because going into places where there are other people is not perfectly safe.

When people speak of medical test results you may believe the results are accurate. Test are not always accurate. They can show a person does not have the virus when they do have it or that a person is free of the virus when they are not (called false-positives and false-negatives). Nothing is certain except that what happens in the future will depend on probability.

NEXT

Thinking of your own gender and height which of the 4 boxes in the contingency table are you in?

Can you explain why you are in that box and not in any of the other three boxes?

	Under 175 cm in height	**175 cm in height or taller**	**Totals**
Male	Number of males who are under 175 cm in height	Number of males who are 175 cm in height or taller	
Female	Number of females who are under 175 cm in height	Number of females who are 175 cm in height or taller	
Totals			

Thinking about complementary sets, would you say that the sets of males and females are complementary sets? Why? Would you say that the sets of people under 175 cm in height and of people 175 cm in height or taller are complementary sets? Why?

Either using real data from a class in your school or some made up data, make up a contingency table using these attributes. When you have found the totals of males and females what relative frequencies can you calculate and what are they?

When you have found the total number of people under 175 cm in height and the total number of people 175 cm or taller what relative frequencies can you calculate and what are they?

Suppose you recorded this data from a Year 12 class, would these relative frequencies be the same as if you took a random sample of 100 learners from your **whole school**? Explain your answer.

Draw a Venn diagram to represent the data in your contingency table.