Unit 1 · Sets

HARDER WORKSHEET

Full marks 30

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 30

1 Find the unknown [7]

Solve the following problems. Show your working.

a. For two sets, $n(A) = 3x$, $n(B) = 2x + 5$, $n(A \cap B) = x$ and $n(A \cup B) = 45$. Find x and $n_0(B)$. **[3]**

Answer: _____

b. In a survey, the numbers of people who like only tea, only coffee and both are in the ratio 3 : 2 : 1, and 12% like neither. 44 people like both. **[4]**

i. How many people were surveyed?

ii. How many like tea?

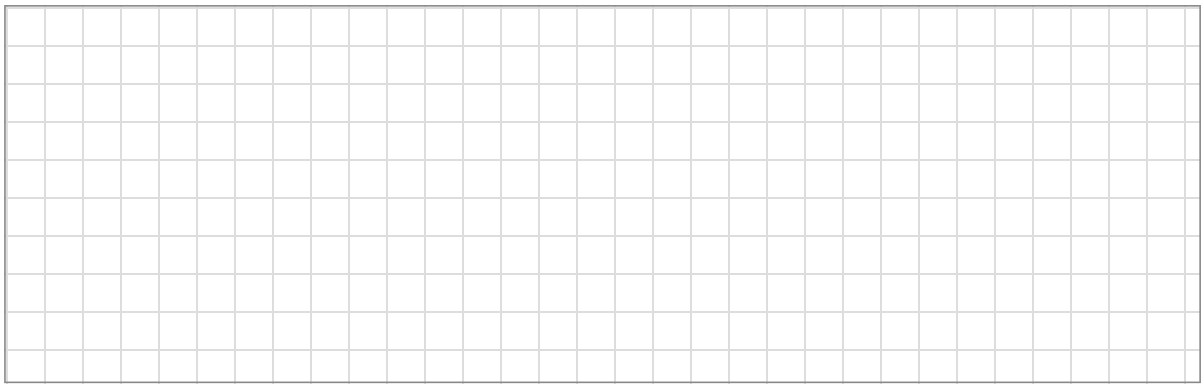
Answer: _____

2 The least and the most [4]

Answer the following question. Show your working.

A ward has 1,200 households. 900 have a mobile phone and 800 have a smartphone.

i. What is the least possible number of households with both?
ii. What is the greatest possible number with both?
iii. A later count finds that 150 households have neither. How many have both?
iv. With the numbers of iii, how many have a smartphone but no mobile phone?



Answer: _____

3 Is it possible? [3]

Answer the following question. Give a reason.

A report on a survey of 100 students says: 60 play football, 50 cricket and 40 volleyball; 20 play football and cricket, 15 cricket and volleyball, and 25 football and volleyball; 5 play all three; and 10 play none of them. Can all these numbers be right? If only the last number is wrong, what should it be?

4 Spot the error [3]

Find the mistake in the working and correct it.

In a school, 40 students are in the choir, 30 in the drama club and 25 in the art club. 70 students are in at least one, and 6 are in all three. Bikash worked out:
$70 = 40 + 30 + 25 -$ (the three pairs) $+ 6$, so the three pairs add up to 31, and "**31 students are in exactly two clubs**".

5 Show it [3]

Answer the following question.

Show that the number of elements in exactly one of two sets is $n_0(A) + n_0(B) = n(A \cup B) - n(A \cap B)$. Then use it: if $n(A \cup B) = 64$ and $n(A \cap B) = 14$, how many elements are in exactly one of the sets?

6 A count with a trick [4]

Solve the following problem. Show your working.

100 people were asked which of three fruits they like, and everyone likes at least one. 50 like apples, 45 like bananas and 40 like guavas, and 4 like all three. The three "two fruits only" regions all hold the same number of people. How many people are in each of those regions, and how many like exactly one fruit?

Answer:

7 In a real setting [4]

Solve the following problem. Show your working.

At a blood donation camp, 200 donors were tested for the three markers of the common blood types, A, B and RhD. 72 had A, 58 had B and 180 had RhD. 14 had A and B, 52 had B and RhD, 64 had A and RhD, and 12 had all three. (The numbers are made up for the problem.)

i. How many donors had none of the three markers (blood type O−)?

ii. How many had RhD only (type O+)?

iii. A patient of type A+ (markers A and RhD) can, roughly, be given red cells whose markers are all among hers: types O−, O+, A− and A+. How many of the donors could give to her?



Answer: _____

8 Make your own [2]

Answer the following question.

Make up numbers for a survey of 50 people about two TV channels, A and B, so that exactly 12 people watch both and exactly 30 watch only one of them. Give $n(A)$, $n(B)$ and the number who watch neither, and show that your numbers fit.