5 In a year group of 63 students, 22 study Biology, 26 study Chemistry, and 25 study Physics. 18 study both Physics and Chemistry, 4 study both Biology and Chemistry, and 3 study both Physics and Biology. 1 studies all three subjects.

a Display this information on a Venn diagram.

b How many students study:

i Biology only

ii Physics or Chemistry

iii none of Biology, Physics, or Chemistry

iv Physics but not Chemistry?

6 36 students participated in the mid-year adventure trip. 19 students went paragliding, 21 went abseiling, and 16 went white water rafting. 7 went abseiling and rafting, 8 went paragliding and rafting, and 11 went paragliding and abseiling. 5 students did all three activities.
Find the number of students who:

a went paragliding or abseiling

b only went white water rafting

c did not participate in any of the activities mentioned

d did exactly two of the activities mentioned.

7 There are 32 students in the woodwind section of the school orchestra. 11 students can play the flute, 15 can play the clarinet, and 12 can play the saxophone. 2 can play the flute and the saxophone, 2 can play the flute and the clarinet, and 6 can play the clarinet and the saxophone. 1 student can play all three instruments. Find the number of students who can play:

a none of the instruments mentioned

b only the saxophone

c the saxophone and the clarinet, but not the flute

d only one of the clarinet, saxophone, or flute.

8 In a particular region, most farms have livestock and crops. A survey of 21 farms showed that 15 grow crops, 9 have cattle, and 11 have sheep. 4 have sheep and cattle, 7 have cattle and crops, and 8 have sheep and crops. 3 have cattle, sheep, and crops. Find the number of farms with:

a only crops

b only animals

c exactly one type of animal, and crops.

4. (a) How many ways are there of arranging seven textbooks on a shelf?

(b) In how many of those arrangements is the single biggest textbook not at either end? *[5 marks]*

5. (a) How many five-digit numbers can be formed by using each of the digits 1–5 exactly once?

(b) How many of those numbers are divisible by 5? *[5 marks]*

6. A class of 16 pupils and their teacher are queuing outside a cinema.

(a) How many different arrangements are there?

(b) How many different arrangements are there if the teacher has to stand at the front? *[5 marks]*

7. A group of nine pupils (five boys and four girls) are lining up for a photograph, with all the girls in the front row and all the boys at the back. How many different arrangements are there? *[5 marks]*

1. Seven athletes take part in the 100 m final of the Olympic games. In how many ways can three medals be awarded? *[4 marks]*

2. In how many ways can five different letters be put into five different envelopes? *[5 marks]*

3. In how many ways can ten cartoon characters stand in a queue if Mickey, Bugs Bunny and Jerry must occupy the first three places in some order? *[5 marks]*

4. How many three digit numbers contain no zeros? *[6 marks]*