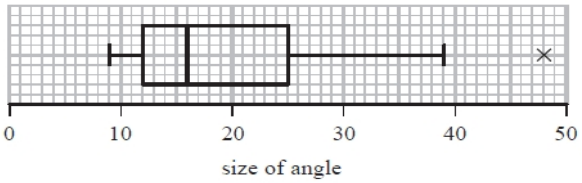
Statistics 7 – Probability and Drawing Venn Diagrams

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

Q1.
Each of 60 students was asked to draw a 20° angle without using a protractor. The size of each angle drawn was measured. The results are summarised in the box plot below.



(a) Find the range for these data.
(b) Find the interquartile range for these data.

The students were then asked to draw a 70° angle. The results are summarised in the table below.

Angle, a, (degrees)	Number of students
$55 \leqslant a < 60$	6
$60 \leqslant a < 65$	15
$65 \leqslant a < 70$	13
$70 \leqslant a < 75$	11
$75 \leqslant a < 80$	8
$80 \leqslant a < 85$	7

(c) Use linear interpolation to estimate the size of the median angle drawn. Give your answer to 1 decimal place.
(d) Show that the lower quartile is 63°

For these data, the upper quartile is 75°, the minimum is 55° and the maximum is 84°
An outlier is an observation that falls either
more than 1.5 × (interquartile range) above the upper quartile or
more than 1.5 × (interquartile range) below the lower quartile.
(e) (i) Show that there are no outliers for these data.
(ii) Draw a box plot for these data
(f) State which angle the students were more accurate at drawing. Give reasons for your answer.

Q2.
The table shows the daily maximum relative humidity, *h* (%), and the daily mean visibility, *v* (dm), in Camborne for the first 16 days in July 1987, from the large data set.

h	97	97	91	73	69	95	95	90	93	93	99	94	94	98	97	95
v	3600	4300	2500	1800	1800	900	2300	4600	4900	3900	2400	3600	2800	700	2400	3500

(a) Find the median and the quartiles for humidity.
(b) An outlier is an observation that falls above $Q_3 + 1.5 \times IQR$ or below $Q_1 - 1.5 \times IQR$. Identify any outliers for humidity.

Section 2 – Consolidation of this week's topic. Please complete all questions.

Total = 22 marks

Q1.
The following shows the results of a survey on the types of exercise taken by a group of 100 people.

65 run
48 swim
60 cycle
40 run and swim
30 swim and cycle
35 run and cycle
25 do all three

(a) Draw a Venn Diagram to represent these data.

(4)

Find the probability that a randomly selected person from the survey
(b) takes none of these types of exercise,

(2)

(c) swims but does not run,

(2)

(d) takes at least two of these types of exercise.

(2)

Q2.
There are 180 students at a college following a general course in computing. Students on this course can choose to take up to three extra options.

112 take systems support,
70 take developing software,
81 take networking,
35 take developing software and systems support,
28 take networking and developing software,
40 take systems support and networking,
4 take all three extra options.

(a) Draw a Venn diagram to represent this information. **(5)**
A student from the course is chosen at random.
Find the probability that this student takes
(b) none of the three extra options, **(1)**
(c) networking only. **(1)**

Q3.
The Venn diagram in Figure 1 shows the number of students in a class who read any of 3 popular magazines *A*, *B* and *C*.

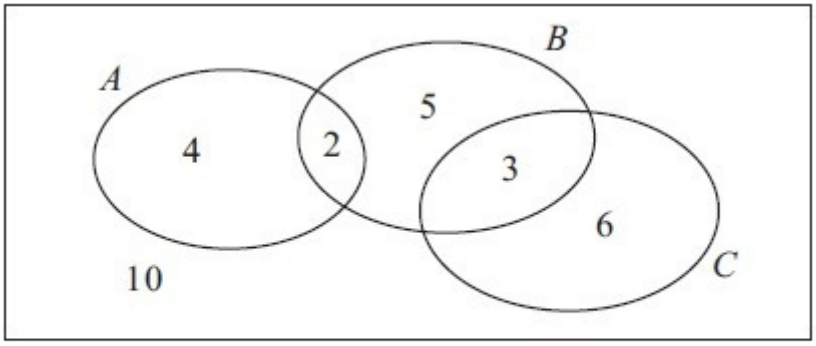


Figure 1

One of these students is selected at random.

(a) Show that the probability that the student reads more than one magazine is $\frac{1}{6}$.

(2)

(b) Find P(*A*U*B*).

(2)

(c) Write down P(*A*∩*C*).

(1)

Section 3 – Extension question. If you are aiming for a top grade, you should attempt these questions.

In a company the 200 employees are classified as full-time workers, part-time workers or contractors.

The table below shows the number of employees in each category and whether they walk to work or use some form of transport.

	Walk	Transport
Full-time worker	2	8
Part-time worker	35	75
Contractor	30	50

The events *F, H* and *C* are that an employee is a full-time worker, part-time worker or contractor respectively. Let *W* be the event that an employee walks to work.

An employee is selected at random.

Find

(a) P(*H*)

(2)

(b) P((F∩W)')

(2)

Let *B* be the event that an employee uses the bus.

Given that 10% of full-time workers use the bus, 30% of part-time workers use the bus and 20% of contractors use the bus,

(c) draw a Venn diagram to represent the events *F, H, C* and *B*,

(4)

(d) find the probability that a randomly selected employee uses the bus to travel to work.

(2)