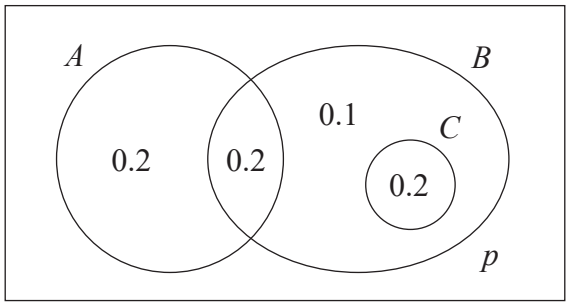
1.



The Venn diagram, where p is a probability, shows the 3 events A, B and C with their associated probabilities.

(a) Find the value of p.

(1)

(b) Write down a pair of mutually exclusive events from A, B and C.

(1)

2. A factory buys 10% of its components from supplier *A*, 30% from supplier *B* and the rest from supplier *C*. It is known that 6% of the components it buys are faulty.

Of the components bought from supplier *A*, 9% are faulty and of the components bought from supplier *B*, 3% are faulty.

(a) Find the percentage of components bought from supplier *C* that are faulty.

(3)

A component is selected at random.

(b) Explain why the event "the component was bought from supplier *B*" is not statistically independent from the event "the component is faulty".

(1)

5. A biased spinner can only land on one of the numbers 1, 2, 3 or 4. The random variable X represents the number that the spinner lands on after a single spin and $P(X = r) = P(X = r + 2)$ for $r = 1, 2$

Given that $P(X = 2) = 0.35$

(a) find the complete probability distribution of X.

(2)

Ambroh spins the spinner 60 times.

(b) Find the probability that more than half of the spins land on the number 4
Give your answer to 3 significant figures.

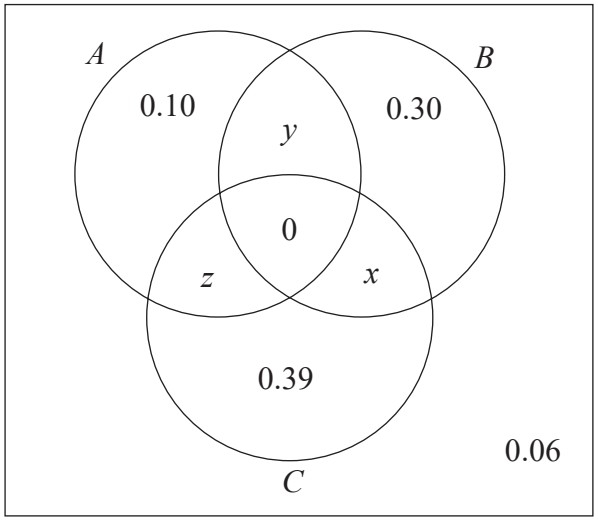
(3)

The random variable $Y = \frac{12}{X}$

(c) Find $P(Y - X \leqslant 4)$

(3)

2. The Venn diagram shows three events, A, B and C, and their associated probabilities.



Events B and C are mutually exclusive.
Events A and C are independent.

Showing your working, find the value of x, the value of y and the value of z.

(5)

3. In a game, a player can score 0, 1, 2, 3 or 4 points each time the game is played.

The random variable S, representing the player's score, has the following probability distribution where a, b and c are constants.

s	0	1	2	3	4
$P(S = s)$	a	b	c	0.1	0.15

The probability of scoring less than 2 points is twice the probability of scoring at least 2 points.

Each game played is independent of previous games played.

John plays the game twice and adds the two scores together to get a total.

Calculate the probability that the total is 6 points.

(6)

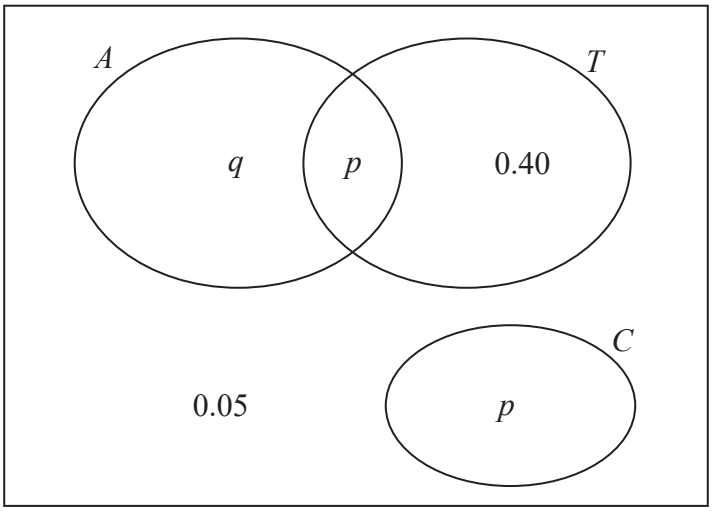
3. The Venn diagram shows the probabilities for students at a college taking part in various sports.

A represents the event that a student takes part in Athletics.

T represents the event that a student takes part in Tennis.

C represents the event that a student takes part in Cricket.

p and q are probabilities.



The probability that a student selected at random takes part in Athletics or Tennis is 0.75

(a) Find the value of p.

(1)

(b) State, giving a reason, whether or not the events A and T are statistically independent. Show your working clearly.

(3)

(c) Find the probability that a student selected at random does not take part in Athletics or Cricket.

(1)

Leave blank

4. A bag contains 19 red beads and 1 blue bead only.

Linda selects a bead at random from the bag. She notes its colour and replaces the bead in the bag. She then selects a second bead at random from the bag and notes its colour.

Find the probability that

(a) both beads selected are blue,

(1)

(b) exactly one bead selected is red.

(2)

In another bag there are 9 beads, 4 of which are green and the rest are yellow.

Linda selects 3 beads from this bag at random without replacement.

(c) Find the probability that 2 of these beads are yellow and 1 is green.

(3)

Linda replaces the 3 beads and then selects another 4 at random without replacement.

(d) Find the probability that at least 1 of the beads is green.

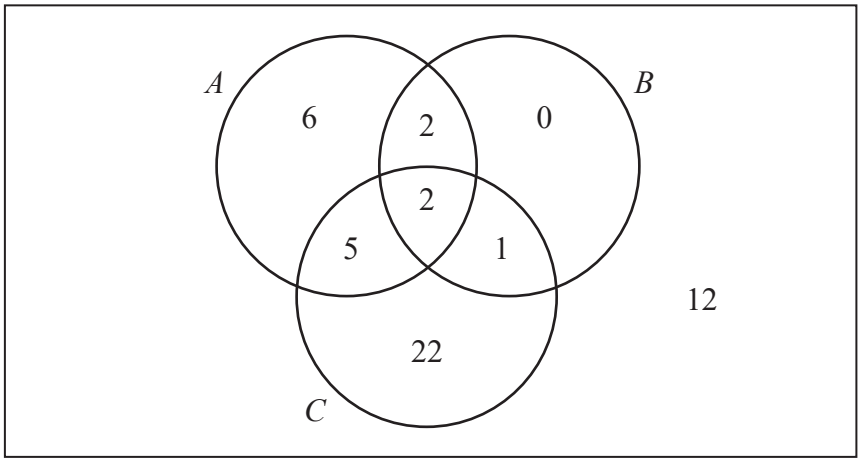
(3)

Leave blank

2. An integer is selected at random from the integers 1 to 50 inclusive.

A is the event that the integer selected is prime.
B is the event that the integer selected ends in a 3
C is the event that the integer selected is greater than 20

The Venn diagram shows the number of integers in each region for the events A, B and C



(a) Describe in words the event $(A \cap B)$

(1)

(b) Write down the probability that the integer selected is prime.

(1)

(c) Find $P([A \cup B \cup C]')$

(1)

Given that the integer selected is greater than 20

(d) find the probability that it is prime.

(2)

Using your answers to (b) and (d),

(e) state, with a reason, whether or not the events A and C are statistically independent.

(2)

Given that the integer selected is greater than 20 and prime,

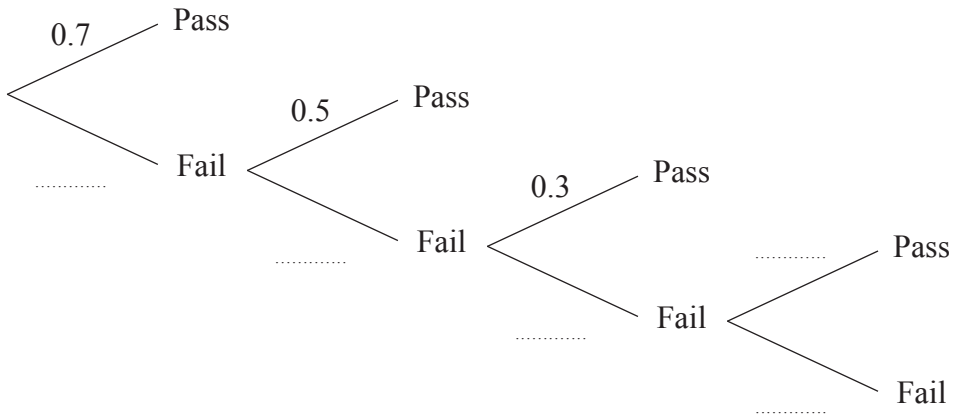
(f) find the probability that it ends in a 3

(2)

Leave blank

4. A training agency awards a certificate to each student who passes a test while completing a course.
Students failing the test will attempt the test again up to 3 more times, and, if they pass the test, will be awarded a certificate.
The probability of passing the test at the first attempt is 0.7, but the probability of passing reduces by 0.2 at each attempt.

(a) Complete the tree diagram below to show this information.



(2)

A student who completed the course is selected at random.

(b) Find the probability that the student was awarded a certificate.

(2)

(c) Given that the student was awarded a certificate, find the probability that the student passed on the first or second attempt.

(3)

The training agency decides to alter the test taken by the students while completing the course, but will not allow more than 2 attempts. The agency requires the probability of passing the test at the first attempt to be p, and the probability of passing the test at the second attempt to be $(p - 0.2)$. The percentage of students who complete the course and are awarded a certificate is to be 95%

(d) Show that p satisfies the equation

$$p^2 - 2.2p + 1.15 = 0$$

(3)

(e) Hence find the value of p, giving your answer to 3 decimal places.

(3)

Leave blank

5. A group of 100 students are asked if they like folk music, rock music or soul music.

All students who like folk music also like rock music

No students like both rock music and soul music

75 students do not like soul music

12 students who like rock music do not like folk music

30 students like folk music

(a) Draw a Venn diagram to illustrate this information.

(4)

(b) State two of these types of music that are mutually exclusive.

(1)

Find the probability that a randomly chosen student

(c) does not like folk music, rock music or soul music,

(1)

(d) likes rock music,

(1)

(e) likes folk music or soul music.

(1)

Given that a randomly chosen student likes rock music,

(f) find the probability that he or she also likes folk music.

(2)