

Probability

Difficulty: Hard

Question Paper 3

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 3

Time allowed: 83 minutes

Score: /72

Percentage: /100

Grade Boundaries:

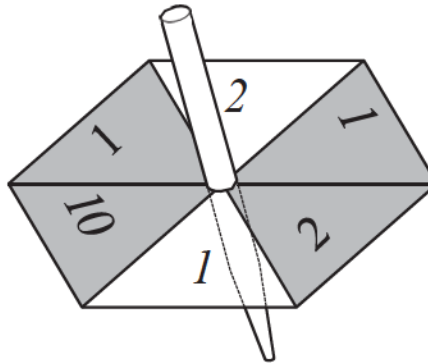
CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

Question 1



The diagram shows a spinner with six numbered sections.
Some of the sections are shaded.
Each time the spinner is spun it stops on one of the six sections.
It is equally likely that it stops on any one of the sections.

(a) The spinner is spun once.

Find the probability that it stops on

(i) a shaded section, [1]

(ii) a section numbered 1, [1]

(iii) a shaded section numbered 1, [1]

(iv) a shaded section or a section numbered 1. [1]

(b) The spinner is now spun twice.

Find the probability that the total of the two numbers is

(i) 20, [2]

(ii) 11. [2]

(c) (i) The spinner stops on a shaded section.

Find the probability that this section is numbered 2. [1]

(ii) The spinner stops on a section numbered 2.

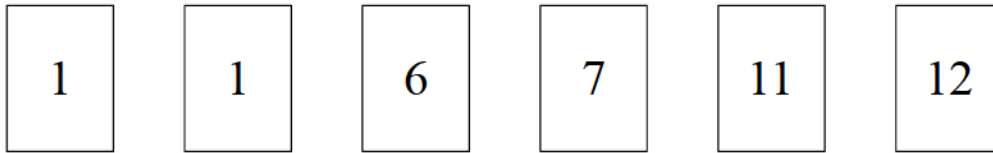
Find the probability that this section is shaded. [1]

(d) The spinner is now spun until it stops on a section numbered 2.

The probability that this happens on the n th spin is $\frac{16}{243}$.

Find the value of n . [2]

Question 2



Six cards are numbered 1, 1, 6, 7, 11 and 12.

In this question, give all probabilities as fractions.

(a) One of the six cards is chosen at random.

(i) Which number has a probability of being chosen of $\frac{1}{3}$? [1]

(ii) What is the probability of choosing a card with a number which is smaller than **at least three of the other numbers**? [1]

(b) Two of the six cards are chosen at random, without replacement.

Find the probability that

(i) they are both numbered 1, [2]

(ii) the total of the two numbers is 18, [3]

(iii) the first number is **not** a 1 and the second number is a 1. [2]

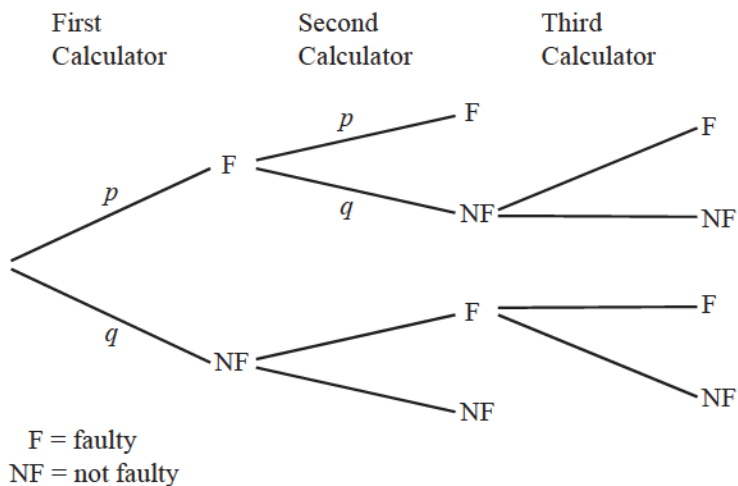
(c) Cards are chosen, without replacement, until a card numbered 1 is chosen.

Find the probability that this happens before the third card is chosen. [2]

(d) A seventh card is added to the six cards shown in the diagram.
The mean value of the seven numbers on the cards is 6.

Find the number on the seventh card. [2]

Question 3



The tree diagram shows a testing procedure on calculators, taken from a large batch.

Each time a calculator is chosen at random, the probability that it is faulty (F) is $\frac{1}{20}$.

(a) Write down the values of p and q . [1]

(b) Two calculators are chosen at random.

Calculate the probability that

(i) both are faulty, [2]

(ii) **exactly one** is faulty. [2]

(c) If **exactly one** out of two calculators tested is faulty, then a third calculator is chosen at random.

Calculate the probability that exactly one of the first two calculators is faulty **and** the third one is faulty.

[2]

(d) The whole batch of calculators is rejected

either if the first two chosen are both faulty
or if a third one needs to be chosen and it is faulty.

Calculate the probability that the whole batch is rejected.

[2]

(e) In one month, 1000 batches of calculators are tested in this way.

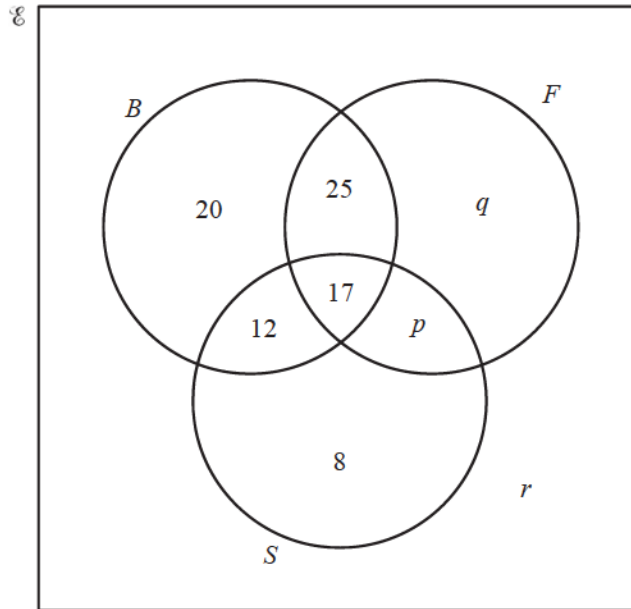
How many batches are expected to be rejected?

[1]

Question 4

In a survey, 100 students are asked if they like basketball (B), football (F) and swimming (S).

The Venn diagram shows the results.



42 students like swimming.

40 students like exactly one sport.

- (a) Find the values of p , q and r . [3]
- (b) How many students like
- all three sports, [1]
 - basketball and swimming but not football? [1]
- (c) Find
- $n(B')$, [1]
 - $n((B \cup F) \cap S')$. [1]
- (d) One student is chosen at random from the 100 students.
Find the probability that the student
- only likes swimming, [1]
 - likes basketball but not swimming. [1]
- (e) Two students are chosen at random from those who like basketball.
Find the probability that they each like exactly one other sport. [3]

Question 5

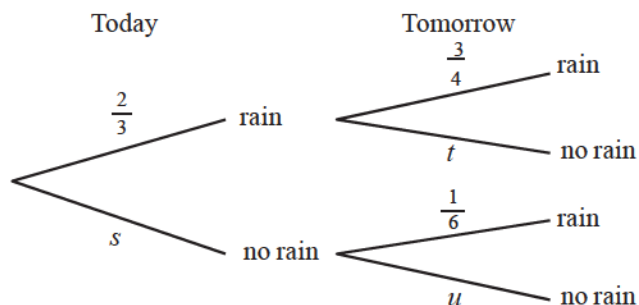
Give your answers to this question as fractions.

(a) The probability that it rains today is $\frac{2}{3}$

If it rains today, the probability that it will rain tomorrow is $\frac{3}{4}$

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$

The tree diagram below shows this information.



- (i) Write down, as fractions, the values of s , t and u . [3]
- (ii) Calculate the probability that it rains on both days. [2]
- (iii) Calculate the probability that it will not rain tomorrow. [2]

(b) Each time Christina throws a ball at a target, the probability that she hits the target is $\frac{1}{3}$.

She throws the ball three times.

Find the probability that she hits the target

- (i) three times, [2]
- (ii) at least once. [2]

(c) Each time Eduardo throws a ball at the target, the probability that he hits the target is $\frac{1}{4}$.

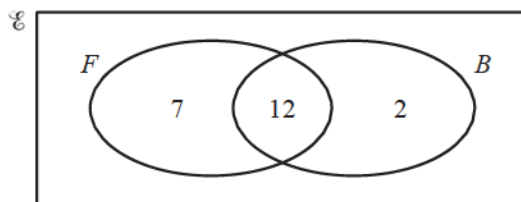
He throws the ball until he hits the target.

Find the probability that he **first** hits the target with his

- (i) 4th throw, [2]
- (ii) n th throw. [1]

Question 6

- (a) All 24 students in a class are asked whether they like football and whether they like basketball. Some of the results are shown in the Venn diagram below.



- $\mathcal{U} = \{\text{students in the class}\}.$
 $F = \{\text{students who like football}\}.$
 $B = \{\text{students who like basketball}\}.$
- (i) How many students like both sports? [1]
- (ii) How many students do not like either sport? [1]
- (iii) Write down the value of $n(F \cup B)$. [1]
- (iv) Write down the value of $n(F' \cap B)$. [1]
- (v) A student from the class is selected at random.
What is the probability that this student likes basketball? [1]
- (vi) A student who likes football is selected at random. What
is the probability that this student likes basketball? [1]
- (b) Two students are selected at random from a group of 10 boys and 12 girls.
Find the probability that
- (i) they are both girls, [2]
- (ii) one is a boy and one is a girl. [3]