1 A bag contains 8 balls.

3 are red and 5 are blue.

2 balls are taken from the bag at random without replacement.

1 (a) Write down the probability that there is **at least** 1 red ball still in the bag.

[1 mark]

Answer 1

2 A packet contains 80 sweets.

The flavour of each sweet is lemon, orange or apple.

A sweet is taken at random.

2 (a) P(lemon or orange) $\leqslant 0.85$

Work out the minimum possible number of **apple** sweets in the packet.

[2 marks]

$0.85 \times 80 = 68$ = lemon + orange

apple = $80 - 68$

$= 12$

(2)

Answer 12

2 (b) P(lemon or apple) < 0.71

There are 31 lemon sweets.

Work out the maximum possible number of **apple** sweets in the packet.

[2 marks]

$0.71 \times 80 = 56.8$ = apple + lemon

apple = $56.8 - 31$

$= 25.8$

≈ 25

(2)

Answer 25

3 In a choir there are 35 men and 48 women.

The probability that a man chosen at random wears glasses is $\frac{2}{5}$

The probability that a woman chosen at random wears glasses is $\frac{3}{8}$

3 (a) A person is chosen at random from the choir.

Work out the probability that the person does **not** wear glasses.

[2 marks]

Total men + women = 35 + 48 = 83

Not wearing glass = 83 − 32 = 51 (1)

P(not wearing glass) = $\frac{51}{83}$ (1)

Answer $\frac{51}{83}$

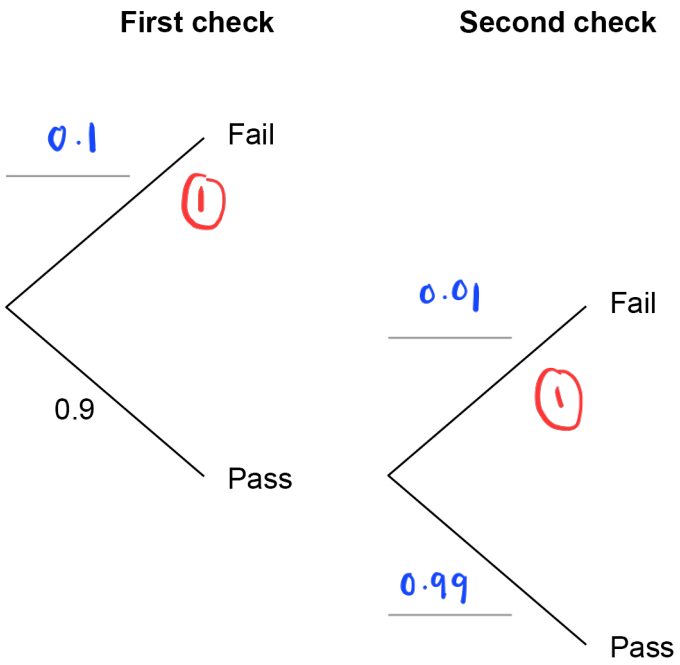
4 Items made at a factory have to pass two checks.

90% pass the first check.
The items that fail are scrapped.

99% of the items that pass the first check pass the second check.
The items that fail are scrapped.

4 (a) Complete the tree diagram.

[2 marks]



4 (b) An item is chosen at random before the checks.

Work out the probability that the item is scrapped.

[3 marks]

$0.1 + (0.9 \times 0.01)$ (1)

$0.1 + 0.009 = 0.109$ (1)

(1)

Answer 0.109

5 20 people were asked which device they used more often, laptop or phone.

The table shows the results.

	Laptop	Phone	Total
Male	2	9	11
Female	4	5	9

5 (a) One male and one female are chosen at random.

Work out the probability that **exactly** one of them said laptop.

[3 marks]

$\left(\frac{2}{11} \times \frac{5}{9}\right) + \left(\frac{4}{9} \times \frac{9}{11}\right)$ (1) (1)

$= \frac{10}{99} + \frac{36}{99}$

$= \frac{46}{99}$ (1)

Answer $\frac{46}{99}$

5 (b) Two males are chosen at random.

Work out the probability that they **both** said phone.

[2 marks]

$\frac{9}{11} \times \frac{8}{10} = \frac{72}{110}$ (1) (1)

Answer $\frac{72}{110}$

6 Liam is trying to remember a 3-digit code.

He knows the rule that

the first digit is a cube number

the second digit is a factor of 16

the third digit is an odd number.

Liam tries at random a code that matches the rule.

Work out the probability that this is the correct code.

[4 marks]

From 1 to 9 :

1st : 1, 8

2nd : 1, 2, 4, 8 (1)

3rd : 1, 3, 5, 7, 9 (1)

$\frac{1}{2} \times \frac{1}{4} \times \frac{1}{5} = \frac{1}{40}$ (1) (1)

Answer $\frac{1}{40}$

7 In a video game, players make their own character.

They choose one of each from

8 faces

4 bodies

5 hairstyles.

7 (a) How many different characters can be made?

[2 marks]

$8 \times 4 \times 5 = 160$ (1) (1)

Answer 160

7 (b) Two characters are made at random.

What is the probability that they are exactly the same?

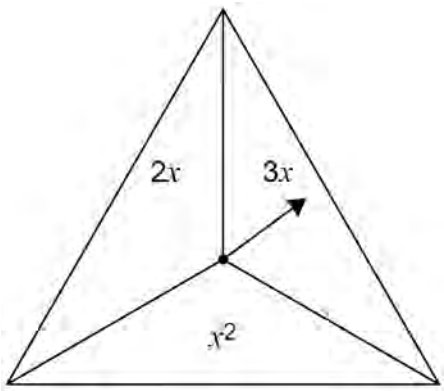
[1 mark]

$\frac{1}{160}$ (1)

Answer $\frac{1}{160}$

8 In a game,

- an ordinary fair six-sided dice is rolled
- the fair spinner shown is spun.



The score is the dice number **substituted** into the spinner expression.

8 (a) Complete the table to show all of the possible scores.

[2 marks]

	1	2	3	4	5	6
2x	2	4	6	8	10	12
3x	3	6	9	12	15	18
x^2	1	4	9	16	25	36

(2)

8 (b) A player wins the game if their score is 10 or more.

Work out the probability that they win the game.

[1 mark]

$\frac{8}{18}$

Answer $\frac{8}{18}$ (1)

8 (c) The game is played 711 times.

Estimate the number of games that are won.

[2 marks]

$\frac{8}{18} \times 711 = 316$ (1) (1)

Answer 316

9 A vending machine has a different item in each section.

It sells

7 drinks, 3 of which are juice

5 snacks, 2 of which are fruit bars

11 meals, 4 of which are salad.

One drink, one snack and one meal are chosen at random.

Show that the probability of getting a juice, a fruit bar and a salad is **more** than 5%

[3 marks]

$\frac{3}{7} \times \frac{2}{5} \times \frac{4}{11} = \frac{24}{385}$ (1)

$= 0.0623 \times 100\%$

$= 6.23\%$ (1)

10 There should be a train leaving a station every hour from 7 am

No trains leave early.

P(the **first train** leaves on time) = 0.9

For all the **other trains**,

if the previous train did leave on time, P(this train leaves on time) = 0.8

if the previous train did **not** leave on time, P(this train leaves on time) = 0.65

10 (a) Work out P(the first three trains leave on time)

[2 marks]

$0.9 \times 0.8 \times 0.8 = 0.576$ (1) (1)

Answer 0.576

11 (a) A fair spinner has six equal sections, each with the number 5, 6, 7 or 8

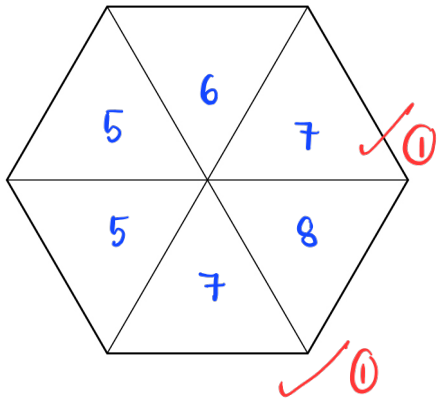
Each number appears at least once.

P(even number) = P(7) — there are two even numbers (6 and 8) there should be two 7 also. Hence, the last number should be 5.

Work out P(5)

You may use the blank spinner to help you.

[3 marks]



✓ 0

✓ 0

Answer $\frac{2}{6}$ ✓ 0

11 (b) A different spinner has ten sections, each labelled A, B, C or D.

	A	B	C	D
Probability	0.1	0.5	0.2	0.3

Give **one** reason why there **must** be a mistake in the table.

[1 mark]

The total probability adds up to 1.1. ✓ 0

12 Archie flips a biased coin 200 times.

Here is some information about the outcomes after each 50 flips.

Total number of flips	50	100	150	200
Number of heads	10	27	37	52

Work out the best estimate for the probability of flipping a head.

Give a reason for your answer.

[2 marks]

Answer $\frac{52}{200}$ ✓1

Reason largest number of flips give the best estimation ✓1

13 On a biased dice,

P(lands on 6) = 0.38

This dice is rolled 150 times.

How many times would you expect the dice **not** to land on 6 ?

[3 marks]

P(not lands on 6) = 1 − 0.38 = 0.62 ✓(1)

150 × 0.62 = 93 ✓(1) ✓(1)

Answer 93