GCSE Exam Questions on Higher Probability

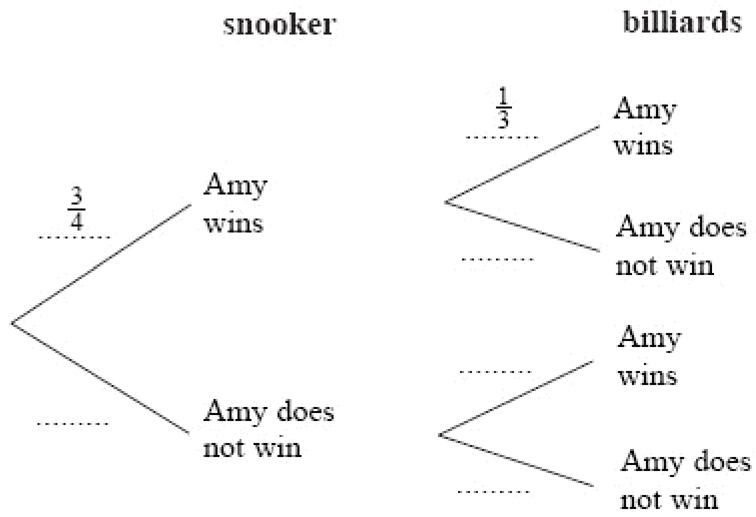
Probability Tree (Grade A)

1. Amy is going to play one game of snooker and one game of billiards.

The probability that she will win the game of snooker is $\frac{3}{4}$

The probability that she will win the game of billiards is $\frac{1}{3}$

Complete the probability tree diagram.



(Total 2 marks)

2. Julie does a statistical experiment. She throws a dice 600 times.
She scores six 200 times.

(a) Is the dice fair? Explain your answer.

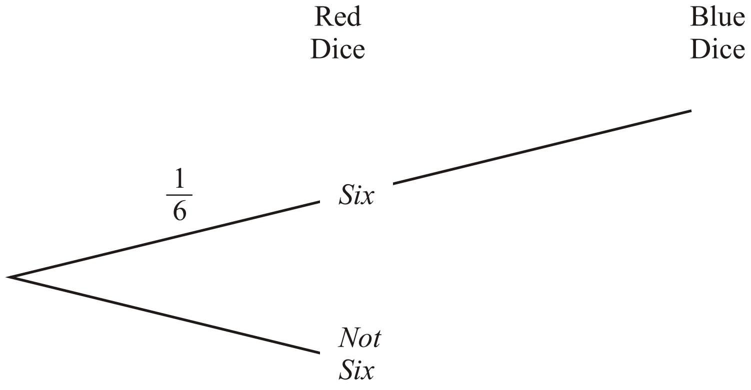
....

....

(1)

Julie then throws a fair red dice once and a fair blue dice once.

(b) Complete the probability tree diagram to show the outcomes.
Label clearly the branches of the probability tree diagram.
The probability tree diagram has been started in the space below.

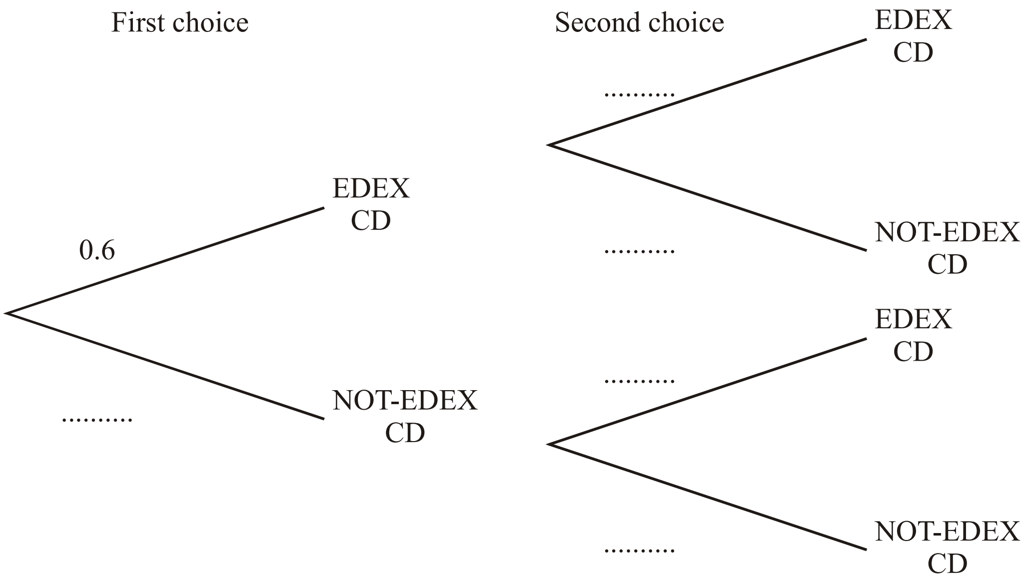


(3)
(Total 4 marks)

3. Amy has 10 CDs in a CD holder.
Amy's favourite group is Edex.
She has 6 Edex CDs in the CD holder.

Amy takes one of these CDs at random.
She writes down whether or not it is an Edex CD.
She puts the CD back in the holder.
Amy again takes one of these CDs at random.

(a) Complete the probability tree diagram.



(2)

(b) Find the probability that Amy will pick two Edex CDs.

....

(2)

Amy had 30 CDs.
The mean playing time of these 30 CDs was 42 minutes.

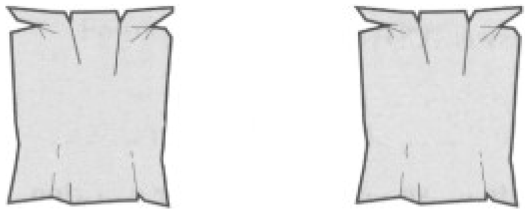
Amy sold 5 of her CDs.
The mean playing time of the 25 CDs left was 42.8 minutes.

(c) Calculate the mean playing time of the 5 CDs that Amy sold.

.... minutes

(3)
(Total 7 marks)

4. Jacob has 2 bags of sweets.

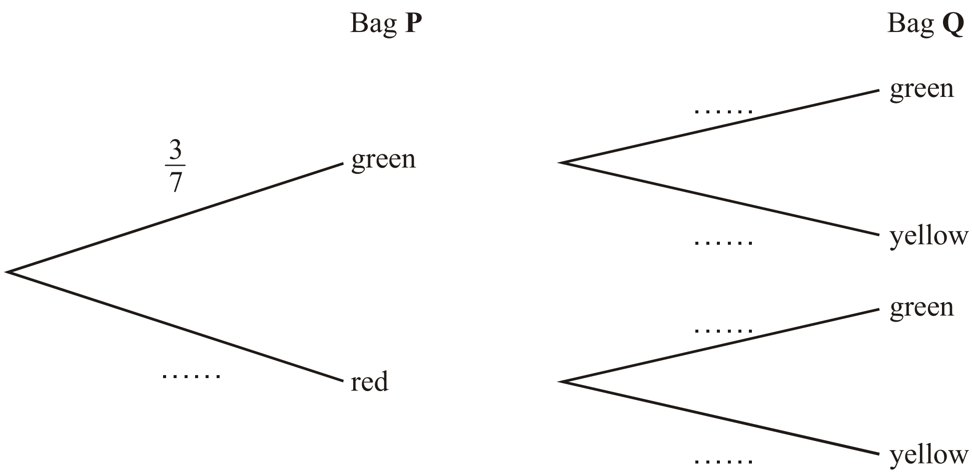


Bag **P** Bag **Q**

Bag **P** contains 3 green sweets and 4 red sweets.
Bag **Q** contains 1 green sweet and 3 yellow sweets.

Jacob takes one sweet at random from each bag.

(a) Complete the tree diagram.



(2)

(b) Calculate the probability that Jacob will take 2 green sweets.

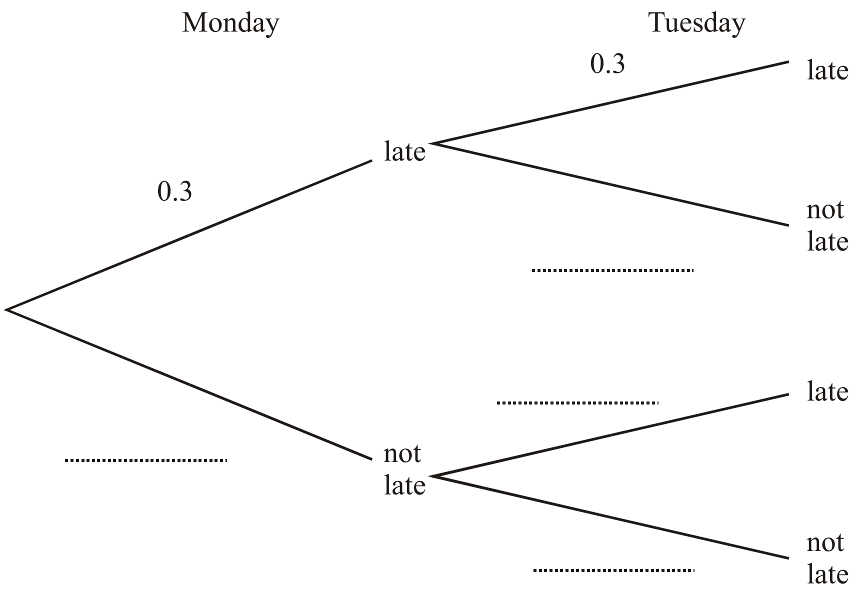
………………….

(2)
(Total 4 marks)

5. Salika travels to school by train every day.

The probability that her train will be late on any day is 0.3

(a) Complete the probability tree diagram for Monday and Tuesday.



(2)

(b) Work out the probability that her train will be late on **at least one** of these two days.

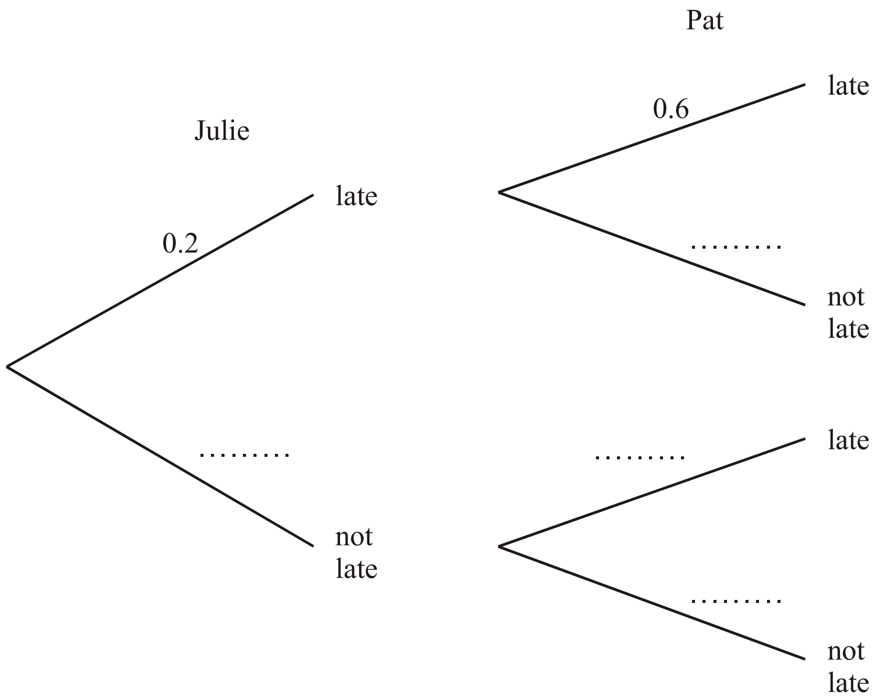
....

(3)
(Total 5 marks)

6. Julie and Pat are going to the cinema.

The probability that Julie will arrive late is 0.2
The probability that Pat will arrive late is 0.6
The two events are independent.

(a) Complete the diagram.



(2)

(b) Work out the probability that Julie and Pat will both arrive late.

…………………………

(2)
(Total 4 marks)

7. A bag contains 3 black beads, 5 red beads and 2 green beads.
Gianna takes a bead at random from the bag, records its colour and replaces it.
She does this two more times.

Work out the probability that, of the three beads Gianna takes, exactly two are the same colour.

....

(Total 5 marks)

8. A bag contains 6 red disks, 4 blue disks and 5 green disks.
A fair dice has 4 faces painted red and the other 2 faces painted blue.

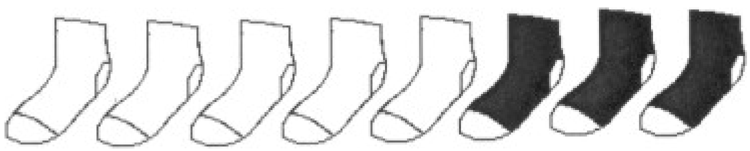
Lisa takes a disk at random from the bag and records its colour.
Lisa then throws the dice twice and each time records the colour of the face it lands on.

Work out the probability that, of the three colours Lisa records, exactly two are the same.

………………………

(Total 5 marks)

9. 5 white socks and 3 black socks are in a drawer.



Stefan takes out two socks at random.

Work out the probability that Stefan takes out two socks of the same colour.

……………………..

(Total 4 marks)

10. The probability that Betty will be late for school tomorrow is 0.05
The probability that Colin will be late for school tomorrow is 0.06

The probability that both Betty and Colin will be late for school tomorrow is 0.011

Fred says that the events ‘Betty will be late tomorrow’ and ‘Colin will be late tomorrow’ are independent.

Justify whether Fred is correct or not.

....

....

....

(Total 2 marks)

ANSWERS

1. $\frac{1}{4}$ on LH branch

$\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches 2

B1
B1

[2]

2. (a) No, as you would expect about 100.
Yes, as it is possible to get 200 sixes with a fair dice 1
B1 for a consistent answer

(b) 3

$\frac{1}{6}, \frac{5}{6}$ + labels

B1 for $\frac{5}{6}$ *on the red dice, not six branch*
B1 for a fully complete tree diagram with all branches labelled
B1 for $\frac{1}{6}$, $\frac{5}{6}$ *on all remaining branches as appropriate*

[4]

3. (a) 0.4
0.6,0.4,
0.6,0.4 2
B1 for LHS: (0.6), 0.4
B1 for RHS: 0.6, 0.4, 0.6, 0.4

(b) 0.36 2

0.6×0.6
M1 $0.6 \times$ "0.6" $[0 <$ "0.6" $< 1]$
A1 cao

(c) 38 3

$(30 \times 42) - (25 \times 42.8) = 1260 - 1070 = 190$
$190 \div 5 =$
M1 for $(30 \times 42) - (25 \times 42.8)$ *or* $1260 - 1070$ *or 190 seen*
M1(dep) for "190" $\div 5$
A1 cao 38

[7]

4. (a) 5 fractions 2

$\frac{4}{7}$ and $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{4}$, $\frac{3}{4}$

B1 for bag P correct
B1 for bag Q correct

(b) $\frac{3}{28}$ oe 2

$\frac{3}{7} \times \frac{1}{4}$

M1 for $\frac{3}{7} \times$ "$\frac{1}{4}$" *(0 < 2nd fraction < 1)*
A1

[4]

5. (a) 0.7, 0.7, 0.3, 0.7 2

B1 for Monday correct
B1 for Tuesday correct

(b) 0.51 oe 3

$1 - 0.7 \times 0.7$

M1 for 0.7×0.7
M1 for 1 – "0.49"
A1 for 0.51 oe
(M1 for 0.3×0.3 ***OR*** 0.7×0.3 ***OR*** 0.3×0.7
M1 for $0.3 \times 0.3 + 0.7 \times 0.3 + 0.3 \times 0.7$
A1 for 0.51 oe)

[5]

6. (a) 0.8,
0.4, 0.6, 0.4 2

B1 for Julie correct
B1 for Pat correct

(b) 0.12 oe 2

0.2×0.6

M1 for 0.2×0.6
A1 cao

[4]

7. $\frac{660}{1000}$ oe 5

Total = 3 + 5 + 2 (= 10)

$\frac{3}{10}\times\frac{3}{10}\times\frac{5}{10}\left(=\frac{45}{1000}\right), \frac{3}{10}\times\frac{3}{10}\times\frac{2}{10}\left(=\frac{18}{1000}\right)$

$\frac{5}{10}\times\frac{5}{10}\times\frac{3}{10}\left(=\frac{75}{1000}\right), \frac{5}{10}\times\frac{5}{10}\times\frac{2}{10}\left(=\frac{50}{1000}\right)$

$\frac{2}{10}\times\frac{2}{10}\times\frac{3}{10}\left(=\frac{12}{1000}\right), \frac{2}{10}\times\frac{2}{10}\times\frac{5}{10}\left(=\frac{20}{1000}\right)$

$3\times\left(\frac{"45"}{1000}+\frac{"18"}{1000}+\frac{"75"}{1000}+\frac{"50"}{1000}+\frac{"12"}{1000}+\frac{"20"}{1000}\right)$

$\frac{660}{1000}$

M3 for all six expressions seen OR their combined equivalents
(M2 for four expressions seen OR their combined equivalents)
(M1 for two expressions seen OR their combined equivalents)
M1 sum of 18 relevant products condone 1 slip

A1 for $\frac{660}{1000}$ *oe*

SC: without replacement maximum M4 A0

SC: Just 2 beads: Answer either $\frac{38}{100}$ *oe OR* $\frac{28}{90}$ *oe B1*

[5]

8. $\frac{29}{45}$ 5

P(green and 2 colours the same) = P(GRR)+P(GBB)= $\frac{5}{15}\times\frac{4}{6}\times\frac{4}{6}+\frac{5}{15}\times\frac{2}{6}\times\frac{2}{6}$

P(blue and 2 reds) = P(RRB)+P(RBR)+P(BRR)

$=\frac{6}{15}\times\frac{4}{6}\times\frac{2}{6}+\frac{6}{15}\times\frac{2}{6}\times\frac{4}{6}+\frac{4}{15}\times\frac{4}{6}\times\frac{4}{6}$

P(red and 2 blues) = P(BBR)+P(BRB)+P(RBB)

$=\frac{4}{15}\times\frac{2}{6}\times\frac{4}{6}+\frac{4}{15}\times\frac{4}{6}\times\frac{2}{6}+\frac{6}{15}\times\frac{2}{6}\times\frac{2}{6}$

P(exactly 2 colours the same) = $\frac{100}{540}+\frac{160}{540}+\frac{88}{540}$

M1 complete relevant branches of a tree diagram oe
(can be implied by equivalent work)
M1 sum of at least 2 double products

A1 for $\frac{5}{15}\times\frac{4}{6}\times\frac{4}{6}+\frac{5}{15}\times\frac{2}{6}\times\frac{2}{6}$ *oe*

M1for either $\frac{6}{15}\times\frac{4}{6}\times\frac{2}{6}+\frac{6}{15}\times\frac{2}{6}\times\frac{4}{6}+\frac{4}{15}\times\frac{4}{6}\times\frac{4}{6}$ *oe*

or for $\frac{4}{15}\times\frac{2}{6}\times\frac{4}{6}+\frac{4}{15}\times\frac{4}{6}\times\frac{2}{6}+\frac{6}{15}\times\frac{2}{6}\times\frac{2}{6}$

A1 for $\frac{348}{540}$ *oe*

NB Award alternative methods equivalent marks

[5]

9. $\frac{26}{56}$ oe 4

$\left(\frac{5}{8}\times\frac{4}{7}\right)+\left(\frac{3}{8}\times\frac{2}{7}\right)$

B1 correct WW or correct BB,
B1 both correct
B1 add their answers ft
B1 cao 13/28 oe

[4]

10. No 2

$0.06 \times 0.05 = 0.003$

M1 for 0.06×0.05
A1 correct conclusion based on 0.003 or 0.06 x 0.05
stated as $\neq 0.0011$
OR M1 for statement that for the two events to be independent
P (BL and CL) = P(BL) $\times$ *P(CL)*

[2]