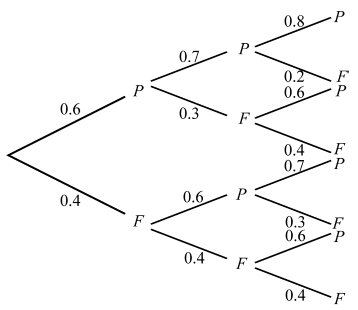
# 4.5 Probability concept\_expected numbers\_P\_2

**1a.** *[3 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

***A1A1A1***

**Note:** Award ***A1*** for each correct column of probabilities.

***[3 marks]***

**1b.** *[2 marks]*

## Markscheme

probability (at least twice) =

**EITHER**

       ***(M1)***

**OR**

       ***(M1)***

**Note:** Award ***M1*** for summing all required probabilities.

**THEN**

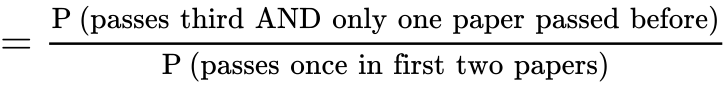
= 0.696***A1***

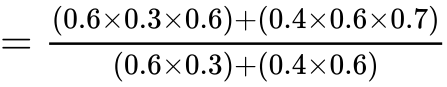
***[2 marks]***

**1c.** *[3 marks]*

## Markscheme

P(passes third paper given only one paper passed before)

      ***(M1)***

      ***A1***

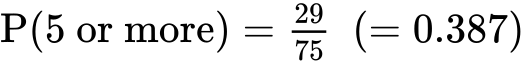
= 0.657***A1***

***[3 marks]***

**2a.** *[2 marks]*

## Markscheme

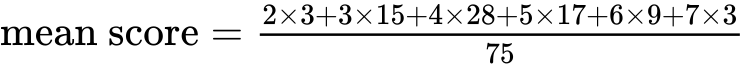
\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

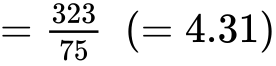
     ***(M1)A1***

***[2 marks]***

**2b.** *[2 marks]*

## Markscheme

     ***(M1)***

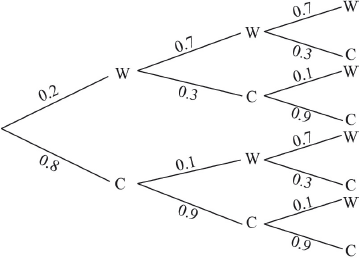
     ***A1***

***[2 marks]***

**3a.** *[3 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

     ***M1A2***

**Note:**     Award ***M1*** for 3 stage tree-diagram, ***A2*** for 0.8, 0.9, 0.3 probabilities correctly placed.

***[3 marks]***

**3b.** *[2 marks]*

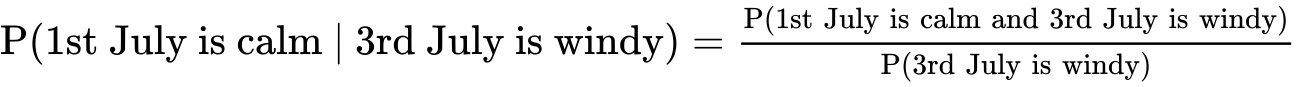
## Markscheme

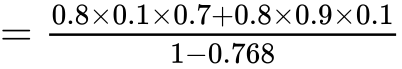
     ***(M1)A1***

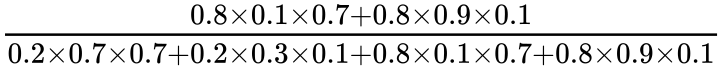
***[2 marks]***

**3c.** *[4 marks]*

## Markscheme

     ***(M1)***



**OR**

**OR**     ***(A1)(A1)***

**Note:**     Award ***A1*** for correct numerator, ***A1*** for correct denominator.

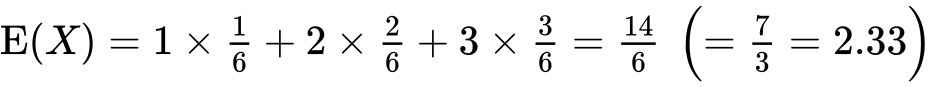
     ***A1***

***[4 marks]***

**4a.** *[2 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

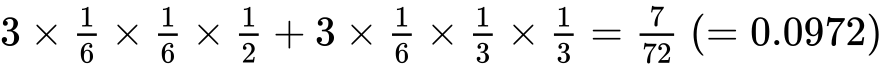
     ***(M1)A1***

***[2 marks]***

**4b.** *[3 marks]*

## Markscheme

     ***(M1)***

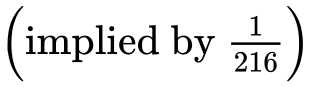
     ***A1***

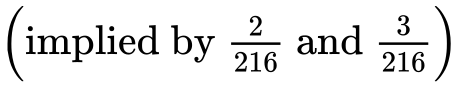
**Note:** Award ***M1*** for attempt to find at least four of the cases.

***[3 marks]***

**4c.** *[3 marks]*

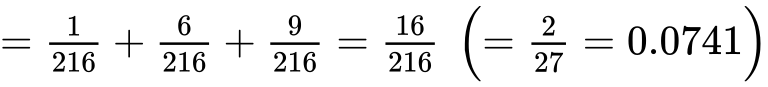
## Markscheme

recognising 111 as a possibility      ***(M1)***

recognising 112 and 113 as possibilities      ***(M1)***

seeing the three arrangements of 112 and 113     ***(M1)***

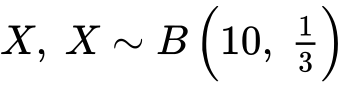


     ***A1***

***[3 marks]***

**4d.** *[3 marks]*

## Markscheme

let the number of twos be      ***(M1)***

     ***(M1)A1***

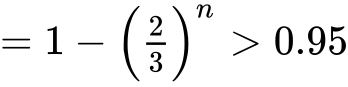
***[3 marks]***

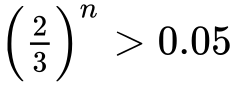
**4e.** *[3 marks]*

## Markscheme

let  be the number of balls drawn

     ***M1***

     ***M1***

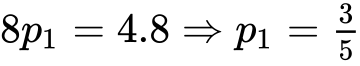


     ***A1***

***[3 marks]***

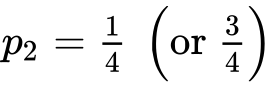
**4f.** *[8 marks]*

## Markscheme

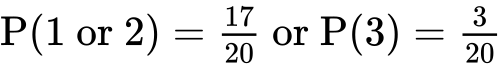
     ***(M1)A1***

     ***(M1)***

     ***(M1)***

     ***A1***

reject  as it gives a total greater than one

     ***(A1)***

recognising LCM as 20 so min total number is 20     ***(M1)***

the least possible number of 3’s is 3     ***A1***

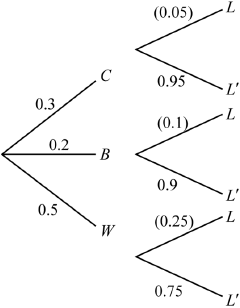
***[8 marks]***

**5.** *[6 marks]*

## Markscheme

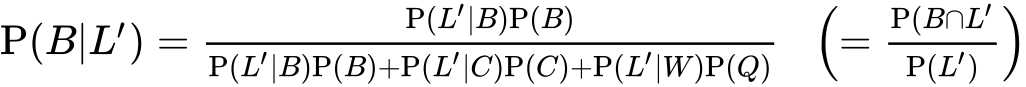
\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

**EITHER**

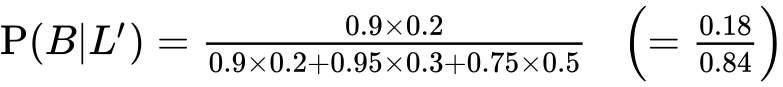
***M1A1A1***

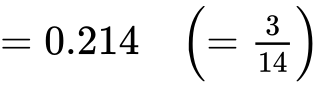
**Note:** Award ***M1*** for a two-level tree diagram, ***A1*** for correct first level probabilities, and ***A1*** for correct second level probabilities.

**OR**

     ***(M1)(A1)(A1)***

**THEN**

     ***M1A1***

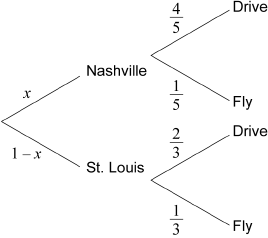
     ***A1***

***[6 marks]***

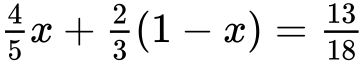
**6a.** *[3 marks]*

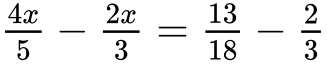
## Markscheme

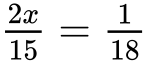
\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.



attempt to set up the problem using a tree diagram and/or an equation, with the unknown      ***M1***

     ***A1***



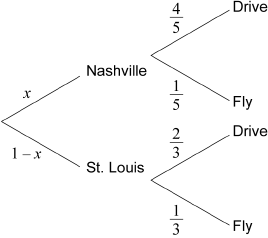


     ***A1***

***[3 marks]***

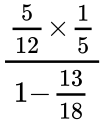
**6b.** *[3 marks]*

## Markscheme

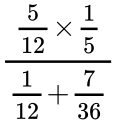


attempt to set up the problem using conditional probability     ***M1***

**EITHER**

     ***A1***

**OR**

     ***A1***

**THEN**

     ***A1***

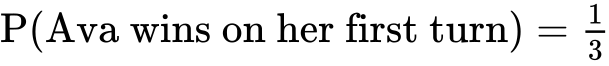
***[3 marks]***

***Total [6 marks]***

**7a.** *[1 mark]*

## Markscheme

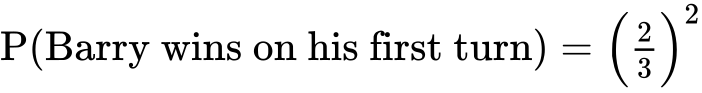
\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

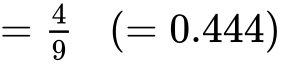
     ***A1***

***[1 mark]***

**7b.** *[2 marks]*

## Markscheme

     ***(M1)***

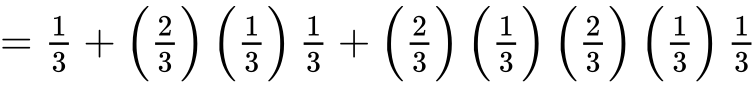
     ***A1***

***[2 marks]***

**7c.** *[4 marks]*

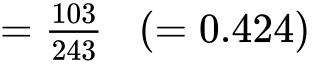
## Markscheme

(Ava wins in one of her first three turns)

     ***M1A1A1***

**Note:** Award ***M1*** for adding probabilities, award ***A1*** for a correct second term and award ***A1*** for a correct third term.

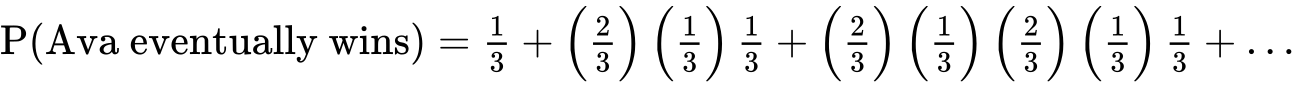
Accept a correctly labelled tree diagram, awarding marks as above.

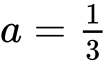
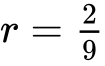
     ***A1***

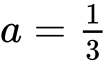
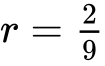
***[4 marks]***

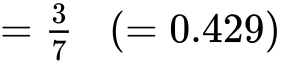
**7d.** *[4 marks]*

## Markscheme

     ***(A1)***

using  with  and      ***(M1)(A1)***

**Note:** Award ***(M1)*** for using  and award ***(A1)*** for  and .

     ***A1***

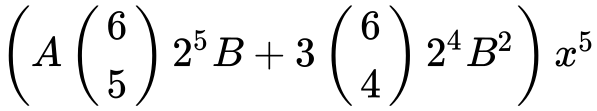
***[4 marks]***

***Total [11 marks]***

**8a.** *[4 marks]*

## Markscheme

\* This question is from an exam for a previous syllabus, and may contain minor differences in marking or structure.

     ***M1A1A1***

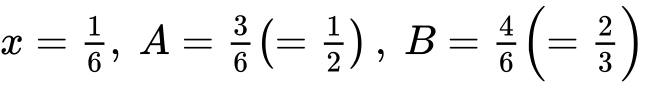
     ***A1***

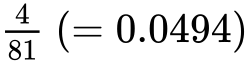
***[4 marks]***

**8b.** *[4 marks]*

## Markscheme

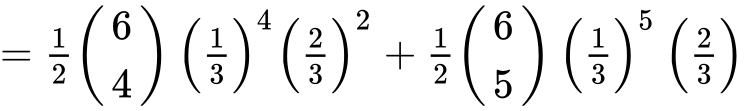
**METHOD 1**

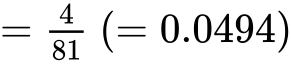
     ***A1A1A1***

probability is      ***A1***

**METHOD 2**

P (5 eaten) =P (M eats 1) P (N eats 4) + P (M eats 0) P (N eats 5)     ***(M1)***

     ***(A1)(A1)***

     ***A1***

***[4 marks]***

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