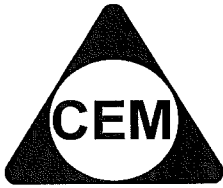


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**YEAR 12 – MATHEMATICS**

**SPECIMEN PAPER 2**  
**TOPIC : PROBABILITY**

AMP 2002 Q5

(a) Five horses numbered 1, 2, 4, 5, 8 are left to run in a race. An “exacta” is to choose the two horses which run first and second respectively.

(i) Using a tree diagram, or otherwise, list all the possible outcomes.

2

(ii) What is the probability that the sum of the two horses in the exacta is 6.

1

AMP 2002 Q10

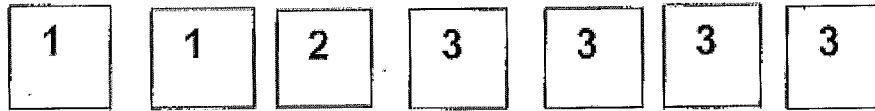
- (b) An alarm system will ring if one of 3 sensors is activated. The first sensor has a probability of 0.6 of being activated. The second sensor a probability of 0.7 and a third sensor has a probability of 0.8 of being activated.

Find the probability that a person

- (i) gets through the first sensor but activates the second. 1
- (ii) gets through all three sensors without activating the alarm. 1

CSSA 2001 Q4

(b)



Two cards are chosen at random and without replacement from the seven cards above. What is the probability that

(i) both cards show a 1

1

(ii) the sum of the two numbers on the cards chosen is greater than 4?

2

**CSSA 2000 Q4**

(b) A box contains five blue, three yellow and eight red beads. Two beads are selected at random from the box without replacement. Find the probability that: 3

(i) both beads are blue.

(ii) at most one of the beads is blue.

CSSA 2000 Q10

- (b) Kellie and Lachlan play a game where they each take turns at throwing two ordinary dice. The winner is the first person to throw a double. Kellie throws first. 5
- (i) Show that the probability that Lachlan wins the game on his first throw is  $\frac{5}{36}$ .

- (ii) Show that the probability Lachlan wins the game on his first or second throw is given by  $\frac{5}{36} + \frac{5^3}{6^4}$ .

- (ii) Calculate the probability that Lachlan wins the game.

**CSSA 2002 Q7**

- (a) A bag contains 5 blue balls, 4 red balls, 2 yellow balls and 1 green ball. Three balls are selected at random without replacement from the bag. Calculate the probability that

(i) the three balls drawn are blue,

**1**

(ii) the three balls drawn are of the same colour,

**2**

(iii) exactly two of the balls drawn are blue.

**2**



SOLUTIONSAMP 2002 Q5

(a) (i)

1,2	2,1	4,1	5,1	8,1
1,4	2,4	4,2	5,2	8,2
1,5	2,5	4,5	5,4	8,4
1,8	2,8	4,8	5,8	8,5

20 possible outcomes ✓✓

$$(ii) P(\text{sum of 6}) = \frac{4}{20} = \frac{1}{5} \checkmark$$

AMP 2002 Q10

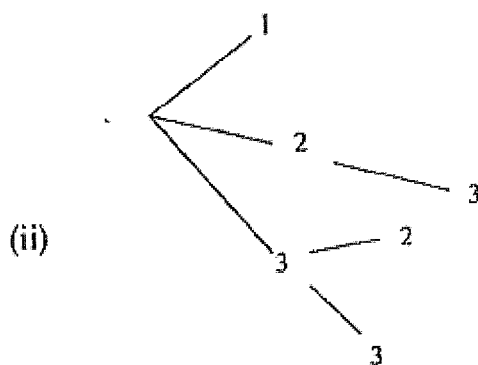
$$(b) (i) P(\tilde{1}, 2) = 0.4 \times 0.7 \\ = 0.28 \checkmark$$

$$(ii) P(\tilde{1}, \tilde{2}, \hat{3}) = 0.4 \times 0.3 \times 0.2 \\ = 0.024 \checkmark$$

CSSA 2001 Q4

(b) (i) 
$$P(11) = \frac{2}{7} \cdot \frac{1}{6}$$

$$= \frac{1}{21}$$



$$P(23) = \frac{1}{7} \cdot \frac{4}{6}$$

$$P(32) = \frac{4}{7} \cdot \frac{1}{6}$$

$$P(33) = \frac{4}{7} \cdot \frac{3}{6}$$

CSSA 2000 Q4

(b)

(i) 
$$P(BB) = \frac{5}{16} \times \frac{4}{15}$$

$$= \frac{1}{12}$$

(ii) 
$$P(\text{at most 1 B}) = 1 - P(BB)$$

$$= 1 - \frac{1}{12} = \frac{11}{12}$$

CSSA 2000 Q10

(b)

(i) P(Kellie loses and Lachlan wins on 1<sup>st</sup> throw)

$$= \frac{30}{36} \times \frac{6}{36} = \frac{5}{6} \times \frac{1}{6} = \frac{5}{36}$$

(ii) P(Lachlan wins on 1<sup>st</sup> or 2<sup>nd</sup>

$$= \frac{5}{36} + \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}$$

$$= \frac{5}{36} + \frac{5^3}{6^4}$$

(iii) For Lachlan to win the game:

$$P(\text{Lachlan wins}) = \left(\frac{5}{6}\right)\left(\frac{1}{6}\right) + \left(\frac{5}{6}\right)^2\left(\frac{1}{6}\right) + \left(\frac{5}{6}\right)^3\left(\frac{1}{6}\right) + \left(\frac{5}{6}\right)^4\left(\frac{1}{6}\right) + \dots$$

$$= \frac{\left(\frac{5}{6}\right)\left(\frac{1}{6}\right)}{1 - \left(\frac{5}{6}\right)^2} = \frac{5}{36} \times \frac{36}{11} = \frac{5}{11}$$

CSSA 2002 Q7

Q7 of 5B, 4R, 2Y, 1G

$$(i) P(BBB) = \frac{5}{12} \times \frac{4}{11} \times \frac{3}{10}$$

$$= \frac{1}{22} \checkmark$$

$$(ii) P(BBB) + P(RRR) = \frac{1}{22} + \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$$

$$= \frac{7}{110} \checkmark$$

$$(iii) P(BB\bar{B}) + P(B\bar{B}B) + P(\bar{B}BB) = \frac{5}{12} \times \frac{4}{11} \times \frac{7}{10} + \frac{5}{12} \times \frac{7}{11} \times \frac{4}{10} + \frac{7}{12} \times \frac{5}{11} \times \frac{4}{10}$$

$$= \frac{7}{22} \checkmark$$