REGULAR QUIZ 08

Form 5

Probability

Part A – MC (@2 marks)

1.	C	
2.	C	Required probability $=1-\text{P(chess lover}\mid\text{not smart)}$ $=1-\dfrac{\text{P(chess lover and not smart)}}{\text{P(not smart)}}$ $=1-\dfrac{\frac{80}{200}\times\frac{50}{80}}{\frac{160}{200}}$ $=\dfrac{11}{16}$
3.	B	Required probability $=1-C_4^5(0.8)^4(0.2)-C_5^5(0.8)^5$ $=0.26272$
4.	A	Required probability $=\dfrac{3}{15}+\left(\dfrac{5}{15}\right)^2\times\dfrac{3}{15}+\left(\dfrac{5}{15}\right)^4\times\dfrac{3}{15}+\cdots$ $=\dfrac{\frac{3}{15}}{1-\left(\frac{5}{15}\right)^2}$ $=\dfrac{9}{40}$
5.	C	Expected gain $=\dfrac{5}{36}(\$3)+\dfrac{5}{36}(\$5)+\dfrac{4}{36}(\$10)=\$\dfrac{20}{9}$
6.	D	Required probability $=\text{P(2 can open}\mid\text{at least 1 can open)}$ $=\dfrac{\text{P(2 can open)}}{\text{P(at least 1 can open)}}$

$$= \frac{\frac{C_2^5 C_1^3}{C_3^8}}{1 - \frac{C_3^3}{C_3^8}}$$

$$= \frac{6}{11}$$

Part B – Short Questions (27 marks)

1. Let x be the number of white balls.

$$\frac{15}{15+x} \times \frac{14}{14+x} = \frac{1}{2}$$ 2M 1M for denominators in LHS; 1M for all correct

$$\frac{210}{x^2 + 29x + 210} = \frac{1}{2}$$

$$x^2 + 29x - 210 = 0$$

$x = 6$ or $x = -35$(rej.) 1A

Thus, the number of white balls is 6.

(3)

2. (a) Required probability

$$= \frac{(C_1^2)^5 (C_1^3)}{C_6^{13}}$$ 1M

$$= \frac{8}{143}$$ 1A r.t. 0.0559

(b) Required probability

$$= \frac{C_5^5 C_1^5 C_2^2 (C_1^2)^4 + C_4^5 C_1^1 C_1^4 C_2^2 (C_1^2)^3 C_1^3 + C_4^5 C_2^3 (C_1^2)^4}{C_6^{13}}$$ 2M 1M for any one case correct; 1M for all cases correct

$$= \frac{200}{429}$$ 1A r.t. 0.466

(5)

3. (a) Required probability

$$= \frac{2}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{9}{15}$$ 1M

$$= \frac{17}{45}$$ 1A r.t. 0.378

(b) Probability of receiving a red ball

$$= \frac{3}{9} + \frac{2}{9} \times \frac{3}{8} + \frac{4}{9} \times \frac{5}{15}$$ 1M

$$= \frac{61}{108}$$ 1A r.t. 0.565

$$> \frac{1}{2}$$

Thus, the claim is agreed. 1A f.t.

(5)

4. (a) Required probability

$= \dfrac{P_3^8 \times 7!}{10!}$ 1M

$= \dfrac{7}{15}$ 1A r.t. 0.467

(b) Required probability

$= \dfrac{P_2^3 \times 8!}{10!}$ 1M

$= \dfrac{1}{15}$ 1A r.t. 0.0667

(c) Required probability

$= \dfrac{\frac{10!}{3!} \times 2!}{10!}$ 1M 1M for $\dfrac{10!}{3!} \times 2!$ or 1209600

$= \dfrac{1}{3}$ 1A r.t. 0.333

(6)

5. (a) Required probability

$= \dfrac{C_3^6 C_2^9}{C_5^{15}}$ 1M

$= \dfrac{240}{1001}$ 1A r.t. 0.240

(b) Required probability

$= \dfrac{C_3^8 C_1^6 C_1^1 + C_1^8 C_3^6 C_1^1 + C_2^8 C_2^6 C_1^1}{C_5^{15}}$ 2M 1M for any one case correct
1M for all cases correct

$= \dfrac{916}{3003}$ 1A r.t. 0.305

(c) Required probability

$= 1 - \dfrac{C_0^6 C_0^1 C_5^8 + C_0^6 C_1^1 C_4^8 + C_1^6 C_1^1 C_3^8}{C_5^{15}}$ 2M 1M for any one cases correct
1M for all cases correct

$= \dfrac{11}{13}$ 1A r.t. 0.846

(8)