**1.** (a) *p*(*A*  *B*) = 0.6 + 0.8 – 1 (M1)  
= 0.4 (A1) (C2)

(b) *p*(*A*  *B*) = *p*((*A*  *B*)) = 1 – 0.4 (M1)  
= 0.6 (A1) (C2)



[4]

**2.** (a) For attempting to use the formula (P(*E*  *F*) = P(*E*)P(*F*)) (M1)

Correct substitution or rearranging the formula A1

*eg* P(*F*), P(*F*) = , P(*F*) =



P(*F*) = A1 N2



(b) For attempting to use the formula (P(*E*  *F*) = P(*E*) + P(*F*)  
 (P(*E*  *F*)) (M1)

P(*E*  *F*) = A1



= A1 N2



[6]

**3.** (a)  
 (A1) (C1)



(b) (i) *n*(*A*  *B*) = 2 (A1) (C1)

(ii) P(*A*  *B*) = (allow **ft** from (b)(i)) (A1) (C1)



(c) *n*(*A*  *B*)  0 (or equivalent) (R1) (C1)

[4]

**4.** (a) A1A1 N2



(b) A1A1 N2

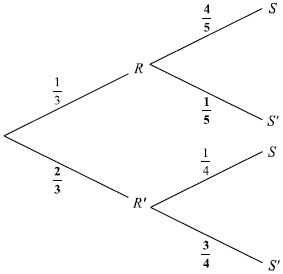


(c) A2 N2



[6]

**5.** (a)



(A1)(A1)(A1)

(b) (i) P(*R  S*) = (A1) (N1)



(ii) P(*S*) = (A1)(A1)



= (A1) (N3)



(iii) P(*R* *S*) = (A1)(A1)



= (A1) (N3)



[10]

**6.** *p*(Red) = *p*(Black) =



(a) (i) *p*(one black) = (M1)(A1)  
 = 0.393 to 3 sf (A1) 3



(ii) *p*(at least one black) = 1 – *p*(none) (M1)  
 = 1 – (A1)  
 = 1 – 0.344  
 = 0.656 (A1) 3



(b) 400 draws: expected number of blacks = (M1)  
 = 50 (A1) 2



[8]

**7.** (a) evidence of binomial distribution (may be seen in parts (b) or (c)) (M1)

*eg np*, 100  0.04

mean = 4 A1 N2

(b) P(*X* = 6) = (A1)



= 0.105 A1 N2

(c) for evidence of appropriate approach (M1)

*eg* complement, 1  P(*X* = 0)

P(*X* = 0) = (0.96)100 = 0.01687... (A1)

P(X  1) = 0.983 A1 N2

[7]

**8.** *X* ~ N (7, 0.52)

(a) (i) *z* = 2 (M1)

P(*X* < 8) = P(*Z* < 2) = 0.977 A1 N2

(ii) evidence of appropriate approach (M1)

*eg* symmetry, *z* = 2

P(6 < *X* < 8) = 0.954 (tables 0.955) A1 N2

**Note:** Award M1A1(AP) if candidates refer to  
 2 standard deviations from the mean,  
 leading to 0.95.

(b) (i)



A1A1 N2

**Note:** Award A1 for d to the left of the mean, A1  
 for area to the left of d shaded.

(ii) *z* =  1.645 (A1)

(M1)



*d* = 6.18 A1 N3

(c) *Y* ~ N(**, 0.52)

P(*Y* < 5) = 0.2 (M1)

*z* =  0.84162... A1

(M1)



** = 5.42 A1 N3

[13]

**9.** (a) For using (0.4 + *p* + 0.2 + 0.07 + 0.02 = 1) (M1)



*p* = 0.31 A1 N2

(b) For using E(*X*) = (M1)



E(*X*) = 1(0.4) + 2(0.31) + 3(0.2) + 4(0.07) + 5(0.02) A1

= 2 A2 N2

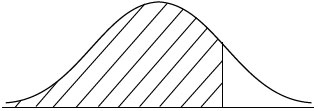
[6]

**10.** (a) 0.0668 A2 N2

(b) Using the standardized value 1.645 (A1)

*k* = 26.1 kg A1 N2

(c)



A1A1 N2

**Note**: Award A1 for vertical line to right of the  
 mean, A1 for shading to left of **their**  
 vertical line.

[6]

**11.** *X* ~ N(**, **2), P(*X* < 3) = 0.2, P(*X* > 8) = 0.1

P(*X* < 8) = 0.9 (M1)

Attempt to set up equations (M1)

A1A1



3  ** = 0.8416**

8 − ** = 1.282**

5 = 2.1236**

** = 2.35, ** = 4.99 A1A1 N4

[6]