

Name:

Class/Set:

# Mutually Exclusive & Independent Events

www.mathsprint.co.uk

1: Are the following events mutually exclusive? Answer 'True' or 'False' and give a reason.

a) Die A lands on a six; die B lands on a four.

\_\_\_\_\_

b) A randomly-selected playing card is a Heart; the same card is a red card.

\_\_\_\_\_

c) A coin lands Heads up; a coin lands Tails up.

\_\_\_\_\_

d) You have a cat; you have a goldfish.

\_\_\_\_\_

e) The first ball you pick from a bag is green; the first ball you pick from a bag is red.

\_\_\_\_\_

f) A die lands on an even number; a die lands on a prime number.

\_\_\_\_\_

2: Two events, A and B, occur with probability  $p(A)$  and  $p(B)$  respectively.

a) If  $p(A) = 0.07$ ,  $p(B) = 0.1$  and  $p(A \text{ or } B) = 0.13$ , are A and B mutually exclusive?

\_\_\_\_\_

b) If  $p(A) = 0.17$ ,  $p(B) = 0.42$  and  $p(A \text{ or } B) = 0.59$ , are A and B mutually exclusive?

\_\_\_\_\_

c) If  $p(A) = \frac{23}{40}$ ,  $p(B) = \frac{1}{8}$  and  $p(A \text{ or } B) = \frac{7}{10}$ , are A and B mutually exclusive?

\_\_\_\_\_

d) If  $p(A) = \frac{1}{3}$ ,  $p(B) = \frac{1}{6}$  and  $p(A \text{ or } B) = 0$ , are A and B mutually exclusive?

\_\_\_\_\_

e) If  $p(A) = 0.05$ ,  $p(B) = 0.08$  and  $p(A \text{ or } B) = 0.0040$ , are A and B mutually exclusive?

\_\_\_\_\_

f) If  $p(A) = 0.13$ ,  $p(B) = 0.07$  and  $p(A \text{ or } B) = 0.20$ , are A and B mutually exclusive?

\_\_\_\_\_

3: Are the following events independent? Answer 'True' or 'False' and give a reason.

a) Die A lands on a six; die B lands on a six.

\_\_\_\_\_

b) It rains today; a coin lands Tails up.

\_\_\_\_\_

c) You pick a green ball from a bag (and don't replace it); you pick a green ball from the same bag.

\_\_\_\_\_

d) The first baby born today is a girl; the last baby born today is a girl.

\_\_\_\_\_

e) The first card dealt from a pack of cards is a Heart; the second card dealt is a Heart.

\_\_\_\_\_

f) The first egg in a box is broken; the second egg in a box is broken.

\_\_\_\_\_

4: Two events, A and B, occur with probability  $p(A)$  and  $p(B)$  respectively.

a) If  $p(A) = \frac{1}{12}$ ,  $p(B) = \frac{1}{4}$  and  $p(A \text{ and } B) = \frac{1}{3}$ , are A and B independent?

\_\_\_\_\_

b) If  $p(A) = \frac{4}{5}$ ,  $p(B) = \frac{1}{20}$  and  $p(A \text{ and } B) = \frac{1}{25}$ , are A and B independent?

\_\_\_\_\_

c) If  $p(A) = \frac{1}{2}$ ,  $p(B) = \frac{3}{10}$  and  $p(A \text{ and } B) = \frac{4}{5}$ , are A and B independent?

\_\_\_\_\_

d) If  $p(A) = 0.17$ ,  $p(B) = 0.06$  and  $p(A \text{ and } B) = 0.0102$ , are A and B independent?

\_\_\_\_\_

e) If  $p(A) = 0.11$ ,  $p(B) = 0.15$  and  $p(A \text{ and } B) = 0.26$ , are A and B independent?

\_\_\_\_\_

f) If  $p(A) = \frac{19}{30}$ ,  $p(B) = \frac{3}{10}$  and  $p(A \text{ and } B) = \frac{19}{100}$ , are A and B independent?

\_\_\_\_\_

# Answers: Mutually Exclusive & Independent Events

www.mathsprint.co.uk

- 1: a) False; both events could happen together.  
b) False; all Hearts are also red.  
c) True; it can't land with both up at once.  
d) False; you could have both.  
e) True; it can't be both colours.  
f) False; it could land on 2 (an even prime).
- 2: a) A and B **are not** mutually exclusive since  $0.13$  does not equal  $0.07 + 0.1$ .  
b) A and B **are** mutually exclusive since  $0.59$  does equal  $0.17 + 0.42$ .  
c) A and B **are** mutually exclusive since  $\frac{7}{10}$  does equal  $\frac{23}{40} + \frac{1}{8}$ .  
d) A and B **are not** mutually exclusive since  $0$  does not equal  $\frac{1}{3} + \frac{1}{6}$ .  
e) A and B **are not** mutually exclusive since  $0.0040$  does not equal  $0.05 + 0.08$ .  
f) A and B **are** mutually exclusive since  $0.20$  does equal  $0.13 + 0.07$ .
- 3: a) True; the dice don't affect each other.  
b) True; the events are not connected.  
c) False; the number of green balls has changed.  
d) True; the events have no connection.  
e) False; if the first card is a Heart then there are fewer Hearts left.  
f) False; the box may have been dropped.
- 4: a) A and B **are not** independent since  $\frac{1}{3}$  does not equal  $\frac{1}{12} \times \frac{1}{4}$ .  
b) A and B **are** independent since  $\frac{1}{25}$  does equal  $\frac{4}{5} \times \frac{1}{20}$ .  
c) A and B **are not** independent since  $\frac{4}{5}$  does not equal  $\frac{1}{2} \times \frac{3}{10}$ .  
d) A and B **are** independent since  $0.0102$  does equal  $0.17 \times 0.06$ .  
e) A and B **are not** independent since  $0.26$  does not equal  $0.11 \times 0.15$ .  
f) A and B **are** independent since  $\frac{19}{100}$  does equal  $\frac{19}{30} \times \frac{3}{10}$ .