Topic Test: Multi-stage Events

Remember: these are HSC-type questions.

Time allowed: 40 minutes **Total marks:** 25

Part A (Suggested time: 15 minutes)

Choose the correct answer (A, B, C or D) for each question. One mark each

1 A card is chosen at random from a regular pack of playing cards. What is the probability that the card is a black five?

A $\frac{1}{13}$ B $\frac{2}{13}$

C $\frac{1}{26}$ D $\frac{1}{52}$

2 Two coins are tossed together. What is the probability that both show heads?

A $\frac{1}{2}$ B $\frac{1}{3}$

C $\frac{1}{4}$ D $\frac{2}{3}$

3 Two people are to be chosen from six to attend a dinner. How many different selections are possible?

A 12 B 15

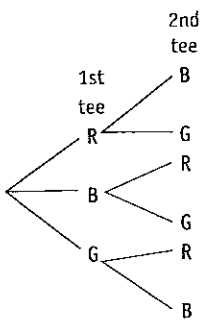
C 30 D 360

4 In how many different ways can four people line up to buy movie tickets?

A 4 B 6

C 12 D 24

5 Stacey drew up the tree diagram to show the possible outcomes when two golf tees are chosen, one after the other without replacement, from a bag holding one red, one blue and one green tee. What is the probability that one tee is red and the other is green?



A $\frac{1}{3}$ B $\frac{1}{6}$

C $\frac{1}{9}$ D $\frac{5}{6}$

6 Five children take part in a race. In how many ways can the first three places be filled?

A 10 B 30

C 60 D 120

7 There are three different routes from P to Q, two routes from Q to R and another four routes from R to S. How many different routes are there from P to S, passing through both Q and R?

A 9 B 12

C 20 D 24

8 Three cards are identical except for the numbers (1, 2 and 3) written on them, one digit on each card. Two of the cards are randomly placed to form a two-digit number. What is the probability that the number is odd?

A $\frac{1}{2}$ B $\frac{1}{3}$ C $\frac{2}{3}$ D $\frac{5}{9}$

9 All of the security codes used in an office consist of a letter of the alphabet followed by a two-digit number. If a security code is chosen at random, what is the probability that it is K56?

A $\frac{1}{2106}$ B $\frac{1}{2600}$

C $\frac{1}{5200}$ D $\frac{1}{6760}$

10 Clarissa is one of six musicians in a band. Two musicians from the band are randomly chosen to do a publicity stunt. What is the probability that Clarissa is chosen?

A $\frac{1}{15}$ B $\frac{2}{15}$

C $\frac{1}{30}$ D $\frac{1}{3}$

Part B (Suggested time: 25 minutes)

Show all working. **15 marks**

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11 a Six people line up to collect a meal in a cafeteria. How many different arrangements are possible? 1 mark

b Gary is one of the six people. What is the probability that Gary is second in the queue? 1 mark

12 Three people are to be selected from eight. How many selections are possible if they are:

a ordered 1 mark

b unordered? 1 mark

13 A box holds seven blue and three green marbles. One is drawn, its colour noted, and then a second one drawn without replacing the first.

a Draw a probability tree diagram, showing the probabilities at each stage. 2 marks

b What is the probability that the marbles are the same colour? 2 marks

14 Seven people (A, B, C, D, E, F and G) are in a reading group. Two people are chosen at random to do a review for the next meeting.

a How many different selections are possible? 1 mark

b Verify the answer to part a by listing the selections. 1 mark

c What is the probability that either A or B (or both) are selected? 1 mark

15 Katrina makes Trina's Triple Trifle Treats. These are tubs holding either chocolate, strawberry, honeycomb or vanilla ice-cream with raspberry, strawberry, mandarin or lime jelly and a topping of either chocolate, passionfruit or raspberry sauce.

a If Katrina likes to have one of each type in her freezer, how many of the treats does she need? 1 mark

b If Katrina chose one at random from the freezer, what is the probability that it has chocolate ice-cream, lime jelly and passionfruit sauce? 1 mark

16 A producer, director and actor are to be chosen at random from a group of ten drama students.

a How many different arrangements are possible? 1 mark

b Mel is one of the ten students. What is the probability that she is one of the chosen? 1 mark

Go to p 290 for **Quick Answers**
or to p 347 for **Worked Solutions**

Solutions

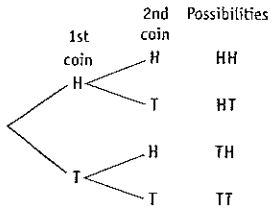
Topic Test p202

1 There are 2 black fives in a pack.

$P(\text{black five}) = \frac{2}{52}$

$= \frac{1}{26}$ C

2



$P(\text{HH}) = \frac{1}{4}$ C

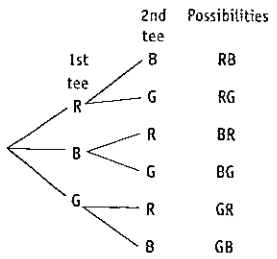
3 Unordered selections $= \frac{6 \times 5}{2 \times 1}$

$= 15$ B

4 Possible ways $= 4 \times 3 \times 2 \times 1$

$= 24$ D

5



$P(\text{RG or GR}) = \frac{2}{6}$

$= \frac{1}{3}$ A

6 Ordered selections $= 5 \times 4 \times 3$

$= 60$ C

7 Number of routes $= 3 \times 2 \times 4$

$= 24$ D

8 Possible numbers are:

12 13 21 23 31 32

$P(\text{odd number}) = \frac{4}{6}$

$= \frac{2}{3}$ C

9 Number of codes $= 26 \times 10 \times 10$

$= 2600$

$P(\text{K56}) = \frac{1}{2600}$ B

10 $P(\text{Clarissa is chosen}) = \frac{2}{6}$

$= \frac{1}{3}$ D

11 a Possible arrangements

$= 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 720$ ✓

b $P(\text{Gary is second}) = \frac{1}{6}$ ✓

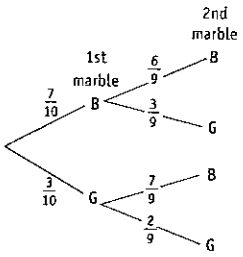
12 a Ordered selections $= 8 \times 7 \times 6$

$= 336$ ✓

b Unordered selections $= \frac{8 \times 7 \times 6}{3 \times 2 \times 1}$

$= 56$ ✓

13 a



✓✓

b $P(\text{same colour}) = P(\text{BB}) + P(\text{GG})$

$= \frac{7}{10} \times \frac{6}{9} + \frac{3}{10} \times \frac{2}{9}$ ✓

$= \frac{8}{15}$ ✓

14 a Unordered selections $= \frac{7 \times 6}{2 \times 1}$

$= 21$

21 different selections are possible. ✓

b

AB	AC	AD	AE	AF	AG
BC	BD	BE	BF	BG	
CD	CE	CF	CG		
DE	DF	DG			
EF	EG				
FG					

✓

c $P(\text{A or B}) = \frac{11}{21}$ ✓

15 a Number of arrangements $= 4 \times 4 \times 3$

$= 48$

Katrina will need 48 tubs in her freezer. ✓

b $P(\text{choc, lime, passionfruit}) = \frac{1}{48}$ ✓

16 a Ordered selections $= 10 \times 9 \times 8$

$= 720$ ✓

b $P(\text{Mel}) = \frac{3}{10}$ ✓