WorkSHEET 9.1 Introduction to models for data

Name: _____

/50

1	Three coins are tossed. Find the probability of obtaining 3 heads.		3
2	A single die is rolled. (a) What is the probability that a 2 will result? (b) What is the probability that a 2 will not result?		4
3	A coin is tossed twice. (a) Draw a tree diagram showing the possible outcomes. (b) Find the probability of obtaining: (i) a head *then* a tail (ii) a head *and* a tail.	(a) (b)	6
4	If the coin in question **3** was biased and landed head up 60% of the time, find the probability that at least 1 head would turn up.		6

5	On any day in December the probability of rain in Brisbane is 0.32, while in Sydney it is 0.25, and in Melbourne it is 0.12. Find the probability that it is: (a) raining in all 3 cities on the same day (b) not raining in all 3 cities on the same day (c) raining in Brisbane and Melbourne but not in Sydney on the same day.	(a) (b) (c)	6
6	Ann's Dad can give her a ride to school on Wednesdays and Thursdays only. The other 3 days she must ride her bicycle. In the month of September, the probability that it rains is 0.2 and the probability that it is overcast is 0.30. The rest of the days are sunny. List the possible outcomes and probabilities using a tree diagram and state the probability that she gets wet riding her bicycle.		5

7 A cricketer has recorded the method with which he was dismissed over the years as shown below:

Method of dismissal	Number of times
Leg-before-wicket (LBW)	20
Caught	12
Run out	5
Bowled by fast bowler	25
Bowled by spin bowler	10
Hit wicket	1
Not out	14

Find the probability that he was dismissed by:

(a) leg-before-wicket (LBW) or by being run out.

(b) being bowled.

(c) any method.

(a)

(b)

(c)

6

8 Consider a regular pack of cards. A card is drawn from the pack. Which of the following outcome pairs are mutually exclusive?

(a) (i) The card is a 6.
(ii) The card is a Queen.

(b) (i) The card is a 6.
(ii) The card is a Spade.

(c) (i) The card is a 6.
(ii) The card is red.

(a)

(b)

(c)

4

9	A card is drawn from a regular deck of 52 playing cards. What is the probability that it is a: (a) black card? (b) Queen? (c) red Queen? (d) Queen or a red card?	(a) (b) (c) (d)	4

10	In a bag of coloured balls there were 8 red balls, 6 green balls, 10 yellow balls, 12 white balls and 4 purple balls. One ball was selected at random. (a) Explain the meaning of the words 'selected at random'. (b) Find the probability that the ball is either red or green. (c) Find the probability that the ball is not white. (d) Find the probability that the ball is either white, green or purple.	(a) . (b) (c) (d)	6

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Name: _____

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1 Three coins are tossed. Find the probability of obtaining 3 heads. 3

$$P(H) = \frac{1}{2}$$

$$P(HHH) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$$

$$\frac{1}{8}$$

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2 A single die is rolled. 4

(a) What is the probability that a 2 will result?

(b) What is the probability that a 2 will not result?

(a) $$P(2) = \frac{\text{number of successful outcomes}}{\text{total number of outcomes}}$$

$$= \frac{1}{6}$$

(b) $$P(2') = 1 - P(2)$$

$$= 1 - \frac{1}{6}$$

$$= \frac{5}{6}$$

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3 A coin is tossed twice. 6

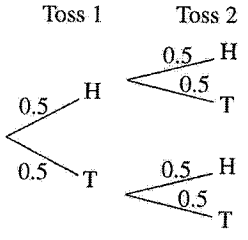
(a) Draw a tree diagram showing the possible outcomes.

(b) Find the probability of obtaining:

(i) a head *then* a tail

(ii) a head *and* a tail.

(a)



(b)

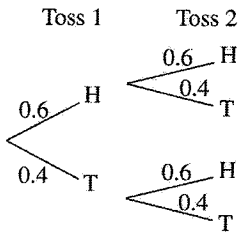
(i) $P(\text{H then T}) = 0.25$

(ii) $P(\text{H and T}) = P(\text{H then T}) + (\text{T then H})$

$= 0.25 + 0.25$

$= 0.5$

4 If the coin in question **3** was biased and landed head up 60% of the time, find the probability that at least 1 head would turn up. 6



$$\begin{aligned} P(\text{at least 1 H}) &= 1 - P(\text{no H}) \\ &= 1 - P(\text{TT}) \\ &= 1 - 0.16 \\ &= 0.84 \end{aligned}$$

5 On any day in December the probability of rain in Brisbane is 0.32, while in Sydney it is 0.25, and in Melbourne it is 0.12. Find the probability that it is: 6

(a) raining in all 3 cities on the same day

(b) not raining in all 3 cities on the same day

(c) raining in Brisbane and Melbourne but not in Sydney on the same day.

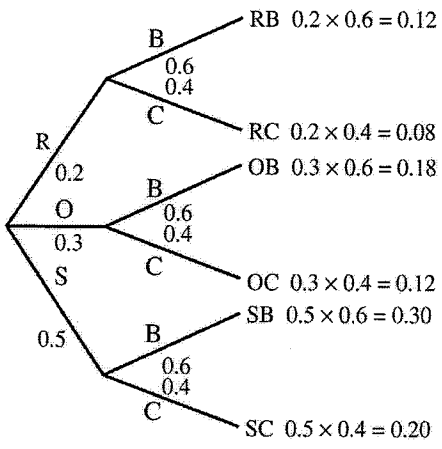
(a) P(rain in Brisbane) = 0.32
P(rain in Sydney) = 0.25
P(rain in Melbourne) = 0.12
P(rain in all 3 cities) = $0.32 \times 0.25 \times 0.12$
= 0.0096

(b) P(no rain in Brisbane) = 1 – 0.32
= 0.68
P(no rain in Sydney) = 1 – 0.25
= 0.75
P(no rain in Melbourne) = 1 – 0.12
= 0.88
P(no rain in all 3 cities)
= $0.68 \times 0.75 \times 0.88$
= 0.4488

(c) P(rain in Brisbane) = 0.32
P(rain in Melbourne) = 0.12
P(no rain in Sydney) = 0.75
P(rain, rain, no rain) = $0.32 \times 0.12 \times 0.75$
= 0.0288

6 Ann's Dad can give her a ride to school on Wednesdays and Thursdays only. The other 3 days she must ride her bicycle. In the month of September, the probability that it rains is 0.2 and the probability that it is overcast is 0.30. The rest of the days are sunny. 5

List the possible outcomes and probabilities using a tree diagram and state the probability that she gets wet riding her bicycle.



P(rain, bicycle) $= 0.2 \times 0.6$
$= 0.12$

7 A cricketer has recorded the method with which he was dismissed over the years as shown below: 6

Method of dismissal	Number of times
Leg-before-wicket (LBW)	20
Caught	12
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Not out	14

Find the probability that he was dismissed by:

(a) leg-before-wicket (LBW) or by being run out.

(b) being bowled.

(c) any method.

(a) P(dismissed by LBW or run out)
$= \frac{20}{87} + \frac{5}{87}$
$= \frac{25}{87}$
$= 0.287$

(b) P(dismissed by being bowled)
$= \frac{25}{87} + \frac{10}{87}$
$= \frac{35}{87}$
$= 0.402$

(c) P(dismissed by any method)
$= \frac{73}{87}$
$= 0.839$

8 Consider a regular pack of cards. A card is drawn from the pack. Which of the following outcome pairs are mutually exclusive? 4

(a) (i) The card is a 6.
(ii) The card is a Queen.

(b) (i) The card is a 6.
(ii) The card is a Spade.

(c) (i) The card is a 6.
(ii) The card is red.

(a) A Queen can not be a 6, so these are mutually exclusive events.

(b) The 6 can also be a Spade, so these are not mutually exclusive events.

(c) The 6 can also be a red or black, so these are not mutually exclusive events.

9 A card is drawn from a regular deck of 52 playing cards. What is the probability that it is a: 4

(a) black card?

(b) Queen?

(c) red Queen?

(d) Queen or a red card?

(a) $P(\text{black}) = \frac{26}{52}$
$= \frac{1}{2}$

(b) $P(\text{Queen}) = \frac{4}{52}$
$= \frac{1}{13}$

(c) $P(\text{red Queen}) = \frac{2}{52}$
$= \frac{1}{26}$

(d) $P(\text{Queen or red}) = \frac{28}{52}$
$= \frac{7}{13}$

10 In a bag of coloured balls there were 8 red balls, 6 green balls, 10 yellow balls, 12 white balls and 4 purple balls. One ball was selected at random. 6

(a) Explain the meaning of the words 'selected at random'.

(b) Find the probability that the ball is either red or green.

(c) Find the probability that the ball is not white.

(d) Find the probability that the ball is either white, green or purple.

(a) Random selection means that 'each ball has equal chance of being selected'.

(b) $\text{P(red or green ball)} = \text{P(red)} + \text{P(green)}$

$$= \frac{8}{40} + \frac{6}{40}$$

$$= \frac{14}{40}$$

$$= \frac{7}{20}$$

$$= 0.35$$

(c) $\text{P(not white)} = 1 - \text{P(white)}$

$$= 1 - \frac{12}{40}$$

$$= \frac{28}{40}$$

$$= \frac{7}{10}$$

$$= 0.7$$

(d) $\text{P(white, green, or purple ball)}$

$$= \text{P(white)} + \text{P(green)} + \text{P(purple)}$$

$$= \frac{12}{40} + \frac{6}{40} + \frac{4}{40}$$

$$= \frac{22}{40}$$

$$= \frac{11}{20}$$

$$= 0.55$$