1 A bag contains 8 balls.

3 are red and 5 are blue.

2 balls are taken from the bag at random without replacement.

1 (a) Write down the probability that there is **at least** 1 red ball still in the bag.

[1 mark]

Answer 1 (1)

1 (b) Work out the probability that there are **at least** 2 red balls still in the bag.

[3 marks]

$3R = \frac{5}{8} \times \frac{4}{7} = \frac{20}{56}$ (1)

$2R = \frac{3}{8} \times \frac{5}{7}$ or $\frac{5}{8} \times \frac{3}{7}$

$= \frac{15}{56}$ or $\frac{15}{56}$

$\frac{20}{56} + 2\left(\frac{15}{56}\right)$ (1)

$= \frac{20}{56} + \frac{30}{56}$

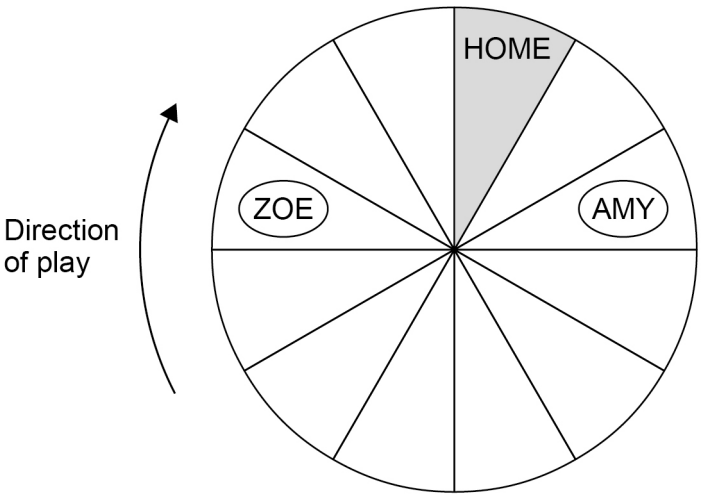
$= \frac{50}{56}$

Answer $\frac{50}{56}$ (1)

2 Zoe and Amy are playing a board game.

- They each have one disc and take turns to roll a fair, ordinary dice.
- The player moves their disc **clockwise** the number of spaces shown on the dice.
- The winner is the first player whose disc is on HOME at the end of a turn.

Here is the board after Amy's turn.



Work out the probability that Zoe wins within her next two turns.

[4 marks]

For Zoe to win, he needs to either get 3 in one turn, or 2 and 1 (vice versa) in 2 turns.

$P(3) = \frac{1}{6}$ (1)

$P(1,2) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ (1)

$P(2,1) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

$= \frac{1}{6} + \frac{1}{36} + \frac{1}{36}$ (1) $= \frac{8 \div 4}{36 \div 4} = \frac{2}{9}$

Answer $\frac{2}{9}$ (1)

3 Circle the expression that means the probability of A and **not** B.

[1 mark]

P(A' U B) P(A U B') P(A' ∩ B) P(A ∩ B')

1

4 Here are three sets of cards.

Set A	1	1	3	5	5	5	6	8
Set B	1	2	4	6	8	8	9	
Set C	3	4	5	6				

In a game, a player has two options.

Option 1
Pick two cards from Set A

Option 2
Pick one card from Set B
and
pick one card from Set C

The cards are picked at random.

The player wins if the total of their two cards is exactly 10

Which option gives a better chance of winning?

Option 1 ✓ (1) Option 2

Show working to support your answer.

[4 marks]

Option 1 : $\frac{3}{8} \times \frac{2}{7} = \frac{6}{56}$ (1)

(both 5)

Option 2 : (4 and 6) (6 and 4)

$\frac{1}{7} \times \frac{1}{4} + \frac{1}{7} \times \frac{1}{4}$

$= \frac{1 \times 4}{14 \times 4} = \frac{4}{56}$ (1)

(1)

5 There should be a train leaving a station every hour from 7 am

No trains leave early.

P(the **first train** leaves on time) = 0.9

For all the **other trains**,

if the previous train did leave on time, P(this train leaves on time) = 0.8

if the previous train did **not** leave on time, P(this train leaves on time) = 0.65

5 (a) Work out P(the first three trains leave on time)

[2 marks]

$0.9 \times 0.8 \times 0.8 = 0.576$ (1) (1)

Answer 0.576

5 (b) The 2 pm train does **not** leave on time.

Work out P(exactly one of the next two trains does **not** leave on time)

[3 marks]

(late, on time) $= 0.35 \times 0.65 = 0.2275$ (1)

(on time, late) $= 0.65 \times 0.2 = 0.13$ (1)

$P = 0.2275 + 0.13$

$= 0.3575$ (1)

Answer 0.3575