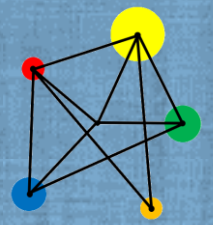
Probability



Understand the probability scale from 0 to 1

Write probabilities using fractions and decimals

Vocabulary

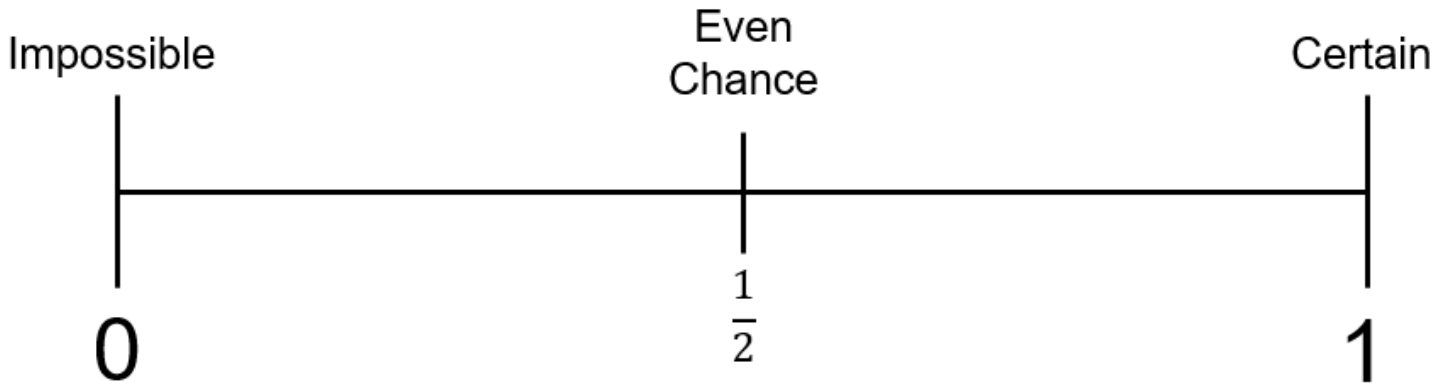
Probability
The chance that something will happen. A probability is always denoted by a number between 0 and 1.

Event
An outcome of an experiment.

Trial
A single run of an experiment.

Key Facts

Probability is measured using a scale from 0 to 1



The probability of getting a head when we flip a fair coin is written as P(Head) = $\frac{1}{2}$.

Example

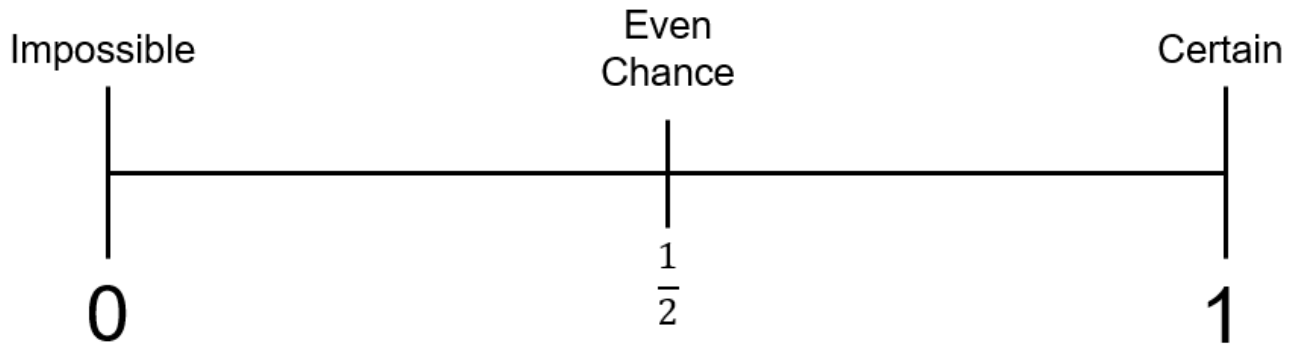
There are 10 round discs in a box.

5 discs are blue 1 disc is red 4 discs are yellow

One disc is selected at random from the box.

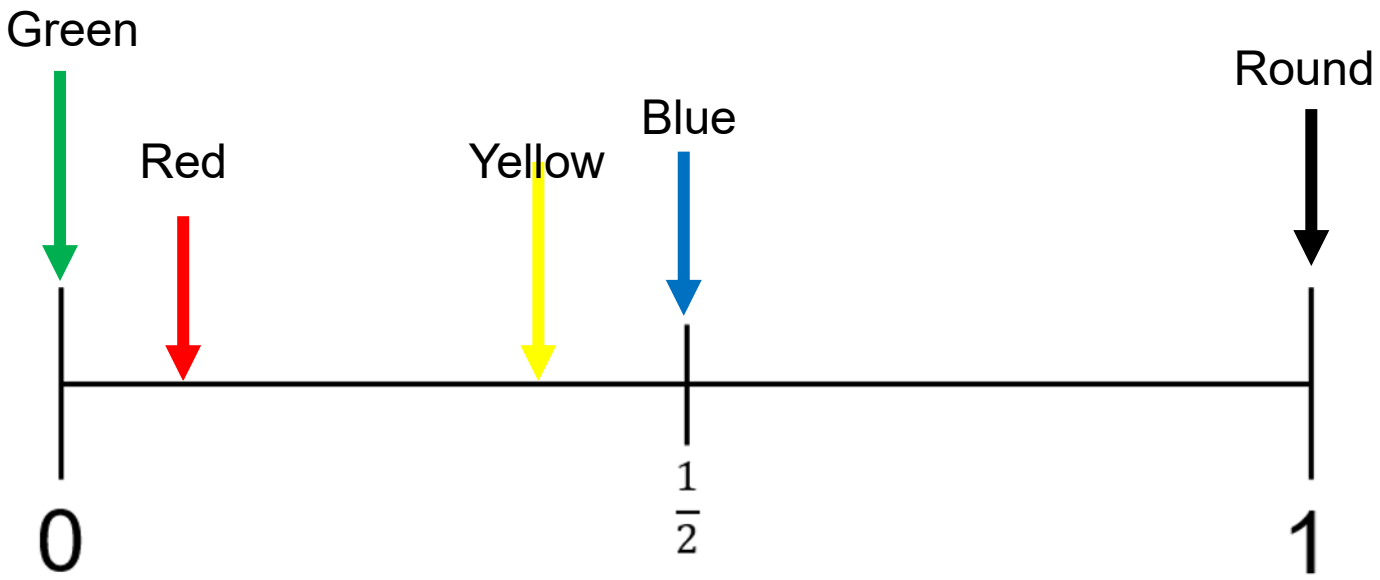
Mark on the diagram the probability that the disc is;

a) Blue b) Red c) Yellow d) Green e) Round



Solution

5 discs are blue 1 disc is red 4 discs are yellow



P(Blue) = $\frac{1}{2}$. P(Red) = $\frac{1}{10}$ P(Yellow) = $\frac{4}{10}$ P(Green) = 0 P(Round) = 1

Example

Nathaniel has some cards with the letters of his name on.

He picks one card at random.

Write down:

a) P(H)

b) P(A)

c) P(M)

d) P(Vowel)

Example

Nathaniel has some cards with the letters of his name on.

He picks one card at random.

Write down:

a) P(H) = $\frac{1}{9}$

b) P(A) = $\frac{2}{9}$

c) P(M) = 0

d) P(Vowel) = $\frac{4}{9}$

Exercise

A fair coin is tossed once. Write down:

1. P (Heads)
2. P (Tails)
3. P (Not Tails)
4. P (Heads or Tails)
5. P (Not Heads and Not Tails)

When a fair dice is thrown, what is:

1. P (6)
2. P (1 or 2)
3. P (Even)
4. P (Not 5)
5. P (7)
6. P (Prime)

The numbers 4 to 104 are placed in a box. A number is taken at random.

Write down:

1. P (100)
2. P (even number)
3. P (square number)
4. P (prime number)

Solutions

A fair coin is tossed once. Write down:

1. P (Heads) $= \frac{1}{2}$
2. P (Tails) $= \frac{1}{2}$
3. P (Not Tails) $= \frac{1}{2}$
4. P (Heads or Tails) $= 1$
5. P (Not Heads and Not Tails) $= 0$

When a fair dice is thrown, what is:

1. P (6) $= \frac{1}{6}$
2. P (1 or 2) $= \frac{2}{6}$
3. P (Even) $= \frac{3}{6}$
4. P (Not 5) $= \frac{5}{6}$
5. P (7) $= 0$
6. P (Prime) $= \frac{3}{6}$

The numbers 4 to 104 are placed in a box. A number is taken at random.

Write down:

1. P (100) $= \frac{1}{101}$
2. P (even number) $= \frac{51}{101}$
3. P (square number) $= \frac{9}{101}$
4. P (prime number) $= \frac{25}{101}$

Example

The probability that a train is late is $\frac{2}{3}$.

What is the probability that the train is not late?

On how many days would you expect the train to be late in a month of 30 days?

Solution

The probability that a train is late is $\frac{2}{3}$.

What is the probability that the train is not late? $\mathbf{\frac{1}{3}}$

On how many days would you expect the train to be late in a month of 30 days?

$\mathbf{\frac{2}{3} \times 30 = 20}$

1) A biased coin has P(Heads) = 0.6.

   a) What is P(tails) ?

   b) The coin is tossed 300 times
   How many heads would you expect?

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2) The probability that a hockey team wins any given match is $\frac{3}{5}$.

   a) What is the probability that the team does not win its next match?

   b) A season consists of 30 matches. How many matches would you expect the team to win in a season?

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3) When a fair dice is thrown, P(6) = $\frac{1}{6}$.

   a) What is P (Not 6) ?

   b) The dice is thrown 900 times
   How many sixes would you expect?

4) The probability of winning a prize in weekly raffle is $\frac{1}{13}$.

   a) What is the probability of not winning a prize?

   b) If you entered the raffle every week for a year, how many prizes would you expect to win?

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5) The probability of a website being down at any given moment is 0.0006.

   a) What the probability that the website is working correctly when I next visit?

   b) For how long would you expect the website to be down in a year of 365 days?

1) A biased coin has P(Heads) = 0.6.

a) What is P(tails) ? **0.4**

b) The coin is tossed 300 times
How many heads would you expect? **180**

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2) The probability that a hockey team wins any given match is $\frac{3}{5}$.

a) What is the probability that the team does not win its next match? $\frac{2}{5}$

b) A season consists of 30 matches. How many matches would you expect the team to win in a season? **18**

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3) When a fair dice is thrown, P(6) = $\frac{1}{6}$.

a) What is P (Not 6) ? $\frac{5}{6}$

b) The dice is thrown 900 times
How many sixes would you expect? **150**

4) The probability of winning a prize in weekly raffle is $\frac{1}{13}$.

a) What is the probability of not winning a prize? $\frac{12}{13}$

b) If you entered the raffle every week for a year, how many prizes would you expect to win? **4**

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5) The probability of a website being down at any given moment is 0.0006.

a) What the probability that the website is working correctly when I next visit? **0.9994**

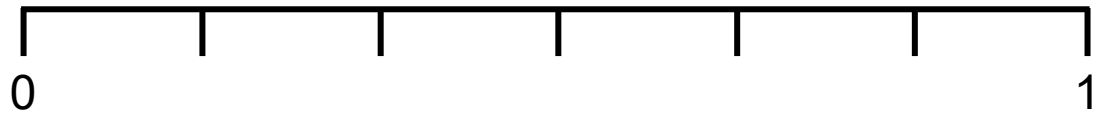
b) For how long would you expect the website to be down in a year of 365 days?
Approximately 5 hours and 15 minutes.

Exam Style Question

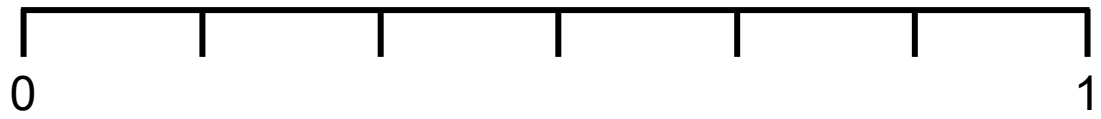
A bag contains 18 counters.
9 are green, 6 are red and 3 are yellow.
A counter is taken from the bag at random.

Mark with an arrow (↓) the probability the counter is

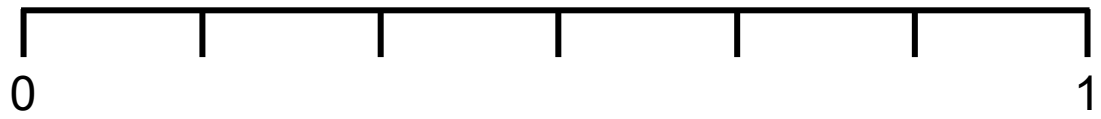
(a) green



(b) red



(c) yellow



Solution

A bag contains 18 counters.
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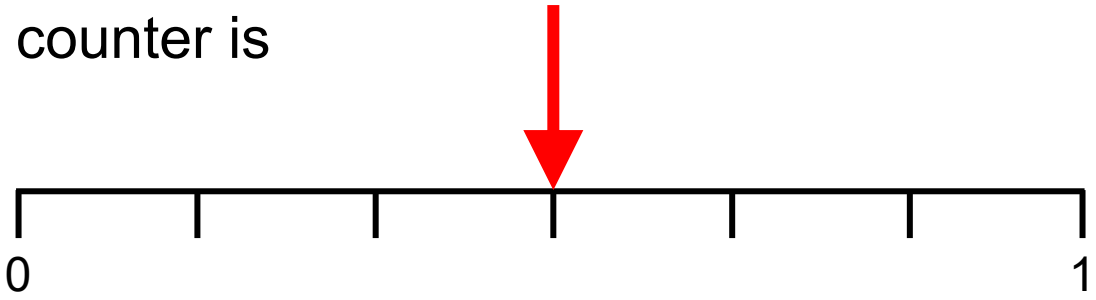
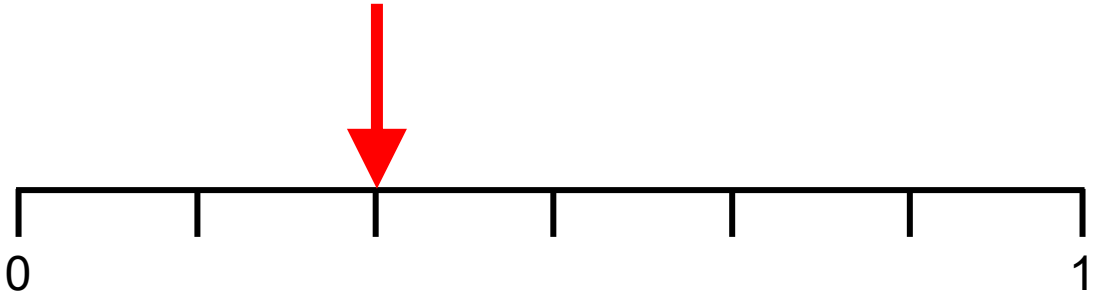
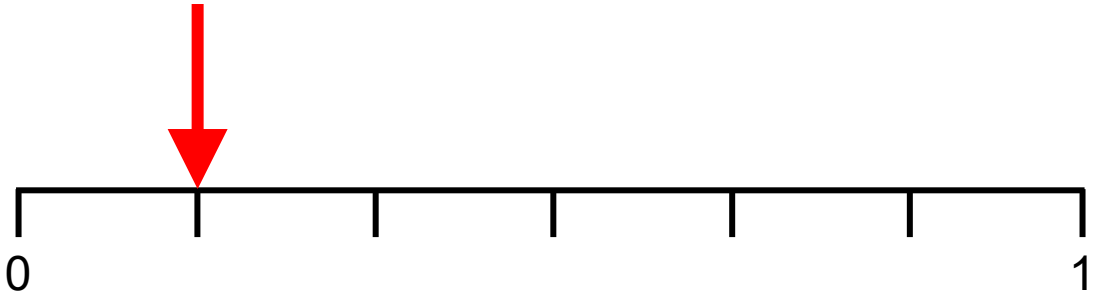
(a) green



(b) red



(c) yellow



Exam Style Question

There are only red counters, blue counters and green counters in a box.

The table shows the probability of taking at random a red counter from the box.

Colour	red	blue	green
Probability	0.4		

The ratio ***number of blue cubes : number of green cubes*** = 4 : 1

a) Complete the table.

There are 80 red cubes in the box.

b) Work out the total number of cubes in the box.

Solution

There are only red counters, blue counters and green counters in a box.

The table shows the probability of taking at random a red counter from the box.

Colour	red	blue	green
Probability	0.4	*0.48*	*0.12*

The ratio ***number of blue cubes : number of green cubes*** = 4 : 1

a) Complete the table. ***0.6 ÷ 5 = 0.12***

4 x 0.12 = 0.48

There are 80 red cubes in the box.

b) Work out the total number of cubes in the box.

80 ÷ 4 = 20

20 x 10 = 200