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Probability

Probability is the likelihood or chance of an event occurring.

Many events can't be predicted with total certainty. The best we can say is how **likely** they are to happen, using the idea of probability.

Tossing a Coin



When a coin is tossed, there are two possible outcomes:

- heads (H) or
- tails (T)

We say that the probability of the coin landing **H** is ½

And the probability of the coin landing **T** is ½

Throwing Dice



When a single die is thrown, there are six possible outcomes: **1, 2, 3, 4, 5, 6**.

The probability of any one of them is $\frac{1}{6}$

In general:

$$\text{Probability of an event happening} = \frac{Number\ of\ ways\ it\ can\ happen}{Total\ number\ of\ outcomes}$$

Example 1:

What is the chances of rolling a "4" with a die

Number of ways it can happen: 1 (there is only 1 face with a "4" on it)

Total number of outcomes: 6 (there are 6 faces altogether)

$$\text{So the probability} = \frac{1}{6}$$

Example 2:

There are 5 pens in a bag: 4 are blue, and 1 is red.

What is the probability that a blue pen gets picked?

Number of ways it can happen: 4 (there are 4 blues)

Total number of outcomes: 5 (there are 5 marbles in total)

$$\text{So the probability} = \frac{4}{5} = 0.8$$

The probabilities lie between 0 and 1

(i) The probability of something which is certain to happen is 1. For example, the probability that the sun will rise from the east tomorrow is 1
(ii) The probability of something which is impossible to happen is 0. For example the probability that man has four eyes = 0
(iii) The probability of something not happening is 1 minus the probability that it will happen.

Exercise

1. Kotol has 15 sweets in his pocket. Five of the sweets are white and the rest are pink. What is the probability of picking at random a white sweet?

2. In a class, there are 60 girls and 30 boys. What is the probability of choosing a girl as a class monitor?

3. A basket contains 8 mangoes. 3 of the mangoes are ripe. If a mango is picked at random from the basket, what is the probability that it is not a ripe one?

4. A bag contains 5 good oranges and 8 rotten oranges. If an orange is picked from the bag at random, what is the probability of picking a good orange?

5. There are 12 eggs in the basket. If 3 eggs are rotten, what is the probability of picking a good egg at random from the basket?

6. A school bag contains 6 yellow and 5 green pencils. Find the probability of picking a yellow pencil at random from the bag.

7. A dice whose faces are numbered 1 to 6 is rolled once by Bbosa. What is the probability that an even number will show up?

8. In a P.7 class, there are 120 pupils, 40% of them are boys

   a) Find the number of girls in the class.

   b) How many more girls are there than boys?

   c) If a class prefect is chosen at random, what is the probability that the prefect chosen is a girl?

9. Norah will celebrate her birthday next week. What is the probability that she will celebrate it on Sunday?

10. Is a class of 36 pupils, 12 are girls and the rest are boys: What in the probability that a pupil selected at-random is a boy?

11. A football team can win, draw or lose a match. What is the probability that it will win the match?

12. A die is rolled once. What is the probability that a prime number will show on top?

13. The probability of a football team winning a game in $^{3}/_{5}$. If the team plays 15 games, how many games are the team expected to win?

14. A basket contains 3 rotten eggs and 6 good ones. If the eggs in the basket are mixed; what is the probability of picking a rotten egg from the basket?

15. Kato wrote three-digit numbers using the digits 1, 3 and 6.

    (a) Write down all the possible 3-digit number greater than 300 that Kato wrote.

    (04 Marks)

    (b) the probability of Kato writing an even number?

    (01 mark)

16. Primary seven pupils will have a party next week. Find the probability that the party will take place on a day that starts with letter 'T'.

17. In a primary school, each pupil plays only one game. The pupils who play each game are given below.

Use the information to answer the questions that that follow.

Foot ball	- 55
Volley ball	- 45
Netball	- 40
Basketball	- 40
Tennis	- 20

-

a) What percentage of the pupils play netball? (02 marks)

b) If a pupil is picked at random, what is the probability that the pupils plays volleyball? (02 mark)

c) Find the mean number of pupils who plays games in the schools. (02 marks)

18. Cards labeled 1to 5 are folded, put in a basket and mixed up. What is the probability of picking a card having a prime number?

19. The mean of the score 8, 9, 6, 4 and x is 6

(a) Find the valve of x (3marks)

(b) What is the median score? (1mark)

(c) Find the probability that score picked at random below the median (2marks)

20. In a basket, 4 rotten eggs are mixed up with 3 good eggs. If an egg in picked at random from the basket, what is the probability of picking a good egg?

21. In a car park there are 192 cars. The probability that a car picked at random from the park is made in Japan is $\frac{5}{8}$.

How many cars are not made in Japan?

Suggested answers

1. Kotol has 15 sweets in his pocket. Five of the sweets are white and the rest are pink. What is the probability of picking at random a white sweet?

Probability of choosing $= \frac{number\ of\ white\ sweets}{total\ number\ of\ sweet} = \frac{5}{15} = \frac{1}{3}$

2. In a class, there are 60 girls and 30 boys. What is the probability of choosing a girl as a class monitor?

Total number of pupils in class = 60 + 30 = 90

Probability of choosing a girl $= \frac{Number\ of\ girls}{Total\ number\ of\ pupil\ in\ class}$

$= \frac{30}{90} = \frac{1}{3}$

3. A basket contains 8 mangoes. 3 of the mangoes are ripe. If a mango is picked at random from the basket, what is the probability that it is not a ripe one?

Number of unripe mangoes = 8 – 3 = 5

Probability of unripe mangoes $= \frac{number\ of\ nuripe\ mango}{total\ number\ of\ mangoes}$

$= \frac{5}{8}$

4. A bag contains 5 good oranges and 8 rotten oranges. If an orange is picked from the bag at random, what is the probability of picking a good orange?

Total number of oranges = 5 + 8 = 13

Probability of picking good orange $= \frac{number\ of\ good\ oranges}{total\ number\ of\ oranges} = \frac{5}{13}$

5. There are 12 eggs in the basket. If 3 eggs are rotten, what is the probability of picking a good egg at random from the basket?

Good eggs = 12-3 = 9

Probability of good eggs $= \frac{9}{12} = \frac{3}{4}$

6. A school bag contains 6 yellow and 5 green pencils. Find the probability of picking a yellow pencil at random from the bag.

Sample space = 6 + 5 = 11

Probability of yellow pencil = $\frac{number\ of\ yellow\ pencils}{total\ number\ of\ pencils} = \frac{6}{11}$

7. A dice whose faces are numbered 1 to 6 is rolled once by Bbosa. What is the probability that an even number will show up?

n{Sample space (1, 2, 3, 4, 5, 6)} = 6

n{even numbers (2, 4, 6)} = 3

Probability of even number = $\frac{3}{6} = \frac{1}{2}$

8. In a P.7 class, there are 120 pupils, 40% of them are boys

d) Find the number of girls in the class.

Percentage of girls = 100 – 40 = 60%

Number of girls = $\frac{60}{100}\ x\ 120$ = 72

e) How many more girls are there than boys?

Number of boys = 120 – 72 = 48

Number of girls more than boys = 72 – 48 = 24

f) If a class prefect is chosen at random, what is the probability that the prefect chosen is a girl?

Probability of girls = $\frac{number\ of\ girls}{total\ number\ of\ pupils} = \frac{72}{120} = \frac{6}{10} = 0.6$

9. Norah will celebrate her birthday next week. What is the probability that she will celebrate it on Sunday?

Probability = $\frac{1}{7}$

10. Is a class of 36 pupils, 12 are girls and the rest are boys: What in the probability that a pupil selected at-random is a boy?

Number of boys = 36 – 12 = 24

Probability of a boy = $\frac{number\ of\ boy}{total\ pupils} = \frac{24}{36} = \frac{2}{3}$

11. A football team can win, draw or lose a match. What is the probability that it will win the match?

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

12. A die is rolled once. What is the probability that a prime number will show on top?

Sample space = {1, 2 ,3, 4, 5, 6}

Prime numbers = {2, 3, 5}

Probability of a prime number on top $= \frac{n\{prime\ numbers)}{n(sample\ space)} = \frac{3}{6} = \frac{1}{3}$

13. The probability of a football team winning a game in $^3/_5$. If the team plays 15 games, how many games are the team expected to win?

$= {}^3/_5 \ x\ 15 = 9$

14. A basket contains 3 rotten eggs and 6 good ones. If the eggs in the basket are mixed; what is the probability of picking a rotten egg from the basket?

Total sample space = 3 + 6 = 9

Probability of picking a rotten egg $= \frac{3}{9} = \frac{1}{3}$

15. Kato wrote three-digit numbers using the digits 1, 3 and 6.

(c) Write down all the possible 3-digit number greater than 300 that Kato wrote.

(04 Marks)

316, 361, 613, 631

(d) What was the probability of Kato writing an even number?

(01 mark)

Only one number (316) is even

∴ the probability of even number $= \frac{1}{4}$

16. Primary seven pupils will have a party next week. Find the probability that the party will take place on a day that starts with letter 'T'.

Days of the week
Mon (M), Tue (T), Wed (W), Thu (T), Fri (F), Sat (S), Sunday (S)
Sample space = 7
Days starting with T = 2

Probability that a day starts with T = $\frac{2}{7}$

17. In a primary school, each pupil plays only one game. The pupils who play each game are given below.

Use the information to answer the questions that that follow.

Foot ball	- 55
Volley ball	- 45
Netball	- 40
Basketball	- 40
Tennis	- 20

-

d) What percentage of the pupils play netball? (02 marks)

Total number of students = 55 + 45 + 40 + 20

= 200

Percentage of pupils who play netball = $\frac{40}{200}\ x\ 100 = 20\%$

e) If a pupil is picked at random, what is the probability that the pupils plays volleyball? (02 mark)

Probability that a pupil plays volley ball = $\frac{number\ of\ student\ that\ play\ voleball}{total\ number\ of\ student}$

$= \frac{45}{200}$

$= \frac{9}{40}$

f) Find the mean number of pupils who plays games in the schools. (02 marks)

Mean number = $\frac{55+45+40+40+20}{5} = 40 pupils$

18. Cards labeled 1to 5 are folded, put in a basket and mixed up. What is the probability of picking a card having a prime number?

Total member are {1, 2, 3, 4, 5)
Prime members are {2, 3, 5)

$$\text{Probability} = \frac{n\{pime\ member\ between\ 1-5\}}{n\{memebrer\ 1-5\}} = \frac{3}{5}$$

19. The mean of the score 8, 9, 6, 4 and x is 6

(a) Find the valve of x (3marks)

$$mean = \frac{sum}{number\ of\ item}$$

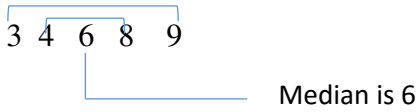
$$\frac{8+9+6+4+X}{5} = 6$$

$$27 + x = 30$$

$$x = 3$$

(c) What is the median score? (1mark)

Median = middle score in order of size



(c) Find the probability that score picked at random below the median (2marks)

Mean = 6

Below mean = {3,4}

$$\text{Probability} = \frac{2}{5}$$

20. In a basket, 4 rotten eggs are mixed up with 3 good eggs. If an egg in picked at random from the basket, what is the probability of picking a good egg?

Total number of egg = number of good ones + number of rotten one

$$= 3 + 4 = 7$$

$$\text{Probability of picking good ones} = \frac{number\ of\ good\ egg}{total\ number\ of\ eggs} = \frac{3}{7}$$

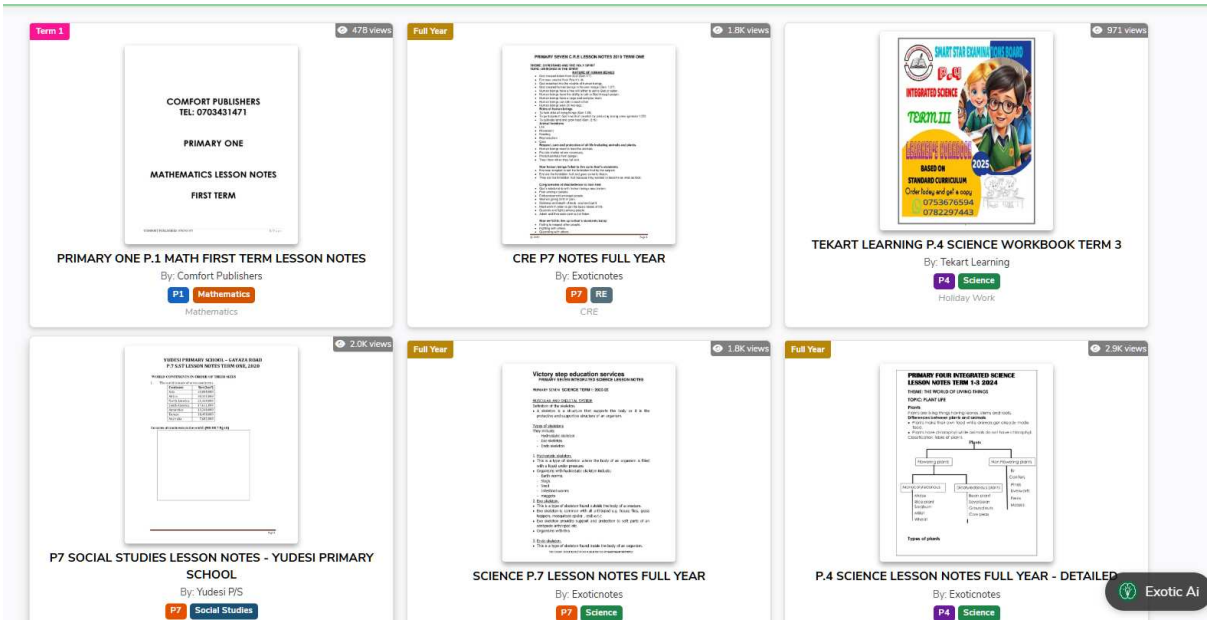
21. In a car park there are 192 cars. The probability that a car picked at random from the park is made in Japan is $\frac{5}{8}$.

How many cars are not made in Japan?

The probability that a car is not made in Japan = 1 - $\frac{5}{8} = \frac{4}{8}$

The number of cars not made in japan = $\frac{4}{8}\ x\ 192 = 96$

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