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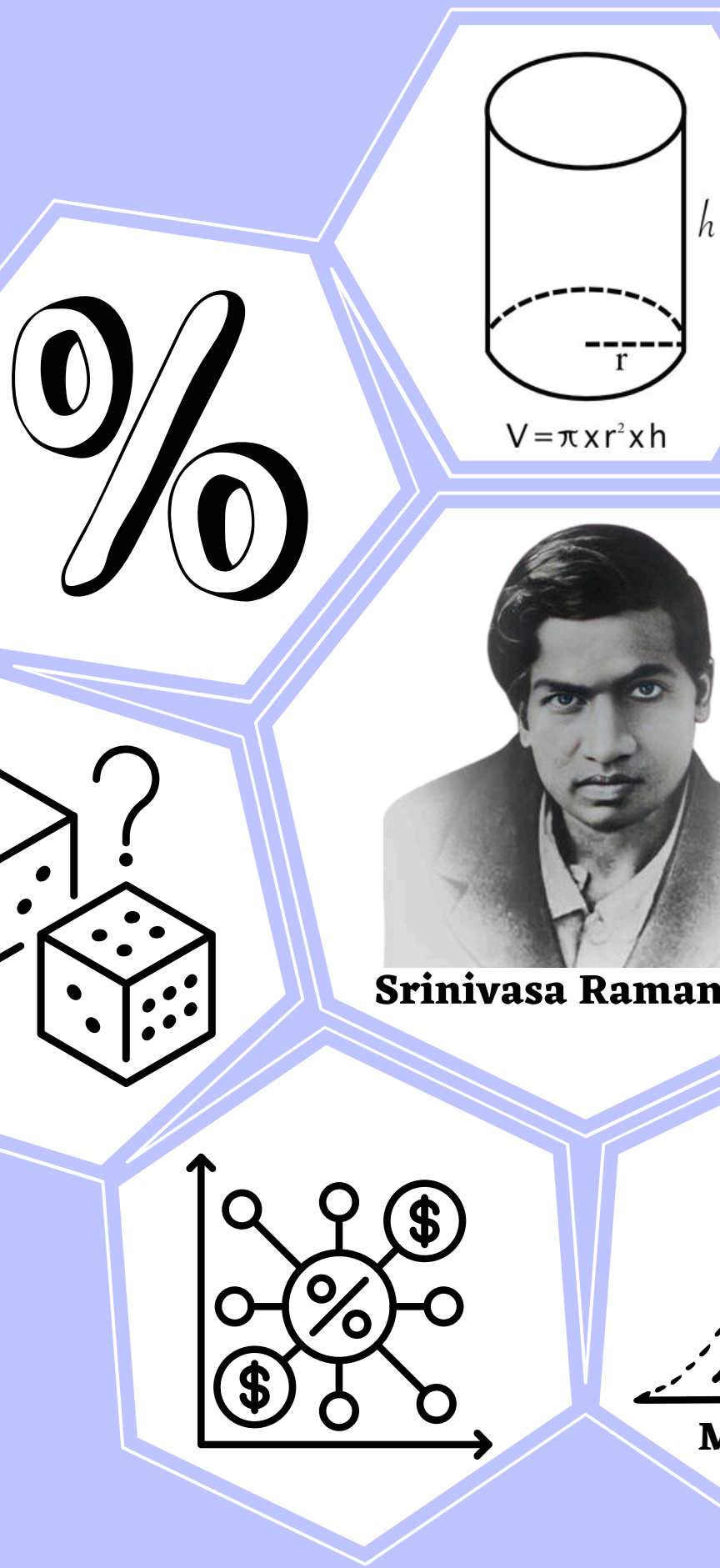
Basic Numeracy (Maths) Question Bank



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Ratio & proportion

1. A and B invest in a business in the ratio 3 : 2. If 5% of the total profit goes to Charity and A's share is Rs. 8,550, then total profit is -

(A) Rs. 15,760
(B) Rs. 15,000
(C) Rs. 14,250
(D) Rs. 15,735
(E) Question not attempted

Ans (B)

Explanation:

Given:

Investment ratio of A and B = 3 : 2

5% of the total profit goes to Charity

A's share = Rs. 8,550

Formula used:

Total profit = (A's share / A's ratio) × Total ratio

Calculation:

Let the total profit be P.

Charity = 5% of P

Profit after charity = 95% of P

A's share = (A's ratio/total ratio)*total profit = (3 / (3 + 2)) × 95% of P

⇒ 8,550 = (3 / 5) × 0.95P

⇒ 8,550 = 0.57P

⇒ P = 8,550 / 0.57

⇒ P = 15,000

∴ The total profit is Rs. 15,000

2. A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1000 more than D, what is B's share?

(A) Rs. 500
(B) Rs. 1500
(C) Rs. 2000
(D) Rs. 2000
(E) Question not attempted

Ans (C)

Explanation:

Given:

money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3

C gets Rs. 1000 more than D

Calculation:

Let the shares of A, B, C and D be Rs. 5x, Rs. 2x, Rs. 4x and Rs. 3x respectively.

C's share - D's share = 1000

Then, 4x - 3x = 1000

x = 1000.

B's share = Rs. 2x = Rs. (2 x 1000) = Rs. 2000.

3. A, B and C enter into a partnership in the ratio $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$. After 4 months, A increases his share 50%. If the total profit at the end of one year be Rs. 21,600, then B's share in the profit is:

(A) Rs. 2100
(B) Rs. 2400
(C) Rs. 3600
(D) Rs. 4000
(E) Question not attempted

Ans (D)

Explanation:

Initially ratio of A B and C is $\frac{7}{2} : \frac{4}{3} : \frac{6}{5}$.

after simplifying this ratio is 105x:40x:36x

after four month A increases his share by 50%

Ratio of their profit is

(105x * 4) + (150/100 * 105x * 8) : (40x * 12) : (36x * 12)

105*16:40*12:36*12

35:10:9

B's share = (B's ratio/total ratio)*total profit

B's share = 10/54*21600 = 4000

Percentage

1. A, B and C jointly thought of engaging themselves in a business venture. It was agreed that A would invest Rs. 6500 for 6 months, B, Rs. 8400 for 5 months and C, Rs. 10,000 for 3 months. A wants to be the working member for which, he was to receive 5% of the profits. The profit earned was Rs. 7400. Calculate the share of B in the profit.

(A) Rs. 1900
(B) Rs. 2660
(C) Rs. 2800
(D) Rs. 2840
(E) Question not attempted

Ans (B)

Explanation:

For managing, A received = 5% of Rs. 7400 = Rs. 370.
Balance = Rs. (7400 - 370) = Rs. 7030.
Ratio of their investments = (6500 x 6) : (8400 x 5) : (10000 x 3)
Ratio of their investments = 39000 : 42000 : 30000
Ratio of their investments = 13 : 14 : 10
B's share = (B's ratio/total ratio)*total profit
B's share = 7030*14/37=2660 Rs

2. A, B and C started a business each investing Rs.10000. After 4 month A withdraws Rs.3000, B withdraws Rs.4000, C invest Rs.3000 more At the end of the years, a total profit was Rs.32800. Find the share of C.

A) Rs. 11400
B) Rs. 14000
C) Rs. 16000
D) Rs. 14400
E) Question not attempted

Ans (D)

Explanation:

Ratio of capital of A, B and C.
= (10,000 × 4 + 7000 × 8) : (10,000 × 4 + 6000 × 8) : (10,000 × 4 + 13000 x 8)
= 96000 : 88000 : 144000
So, Ratio becomes 12 : 11 : 18
Distributing the final profit of Rs. 32800 in the given ratio,
The share of C = (C's ratio/total ratio)*total profit
The share of C = 18/41*32800 = 14400

3. Person A started a business by investing Rs. 65,000. After a few months, B joined him by investing Rs. 50,000. Three months after the joining of B, C joined the two with an investment of Rs. 55,000. At the end of the year, A got 50% of profit as his share. For how many months did A alone finance the business?

(A) 4
(B) 2
(C) 5
(D) 3
(E) Question not attempted

Ans (D)

Explanation:

given:
Person A started a business by investing Rs. 65,000.
After a few months, B joined him by investing Rs. 50,000.
Three months after the joining of B, C joined the two with an investment of Rs. 55,000.
A got 50% of profit as his share.
Formula used:
Profit ratio = Investment1 × Time1 : Investment2 × Time2 : ..... Investmentn × Timen
Calculation:
Let B invest the amount after x months
A invest for 12 month
B invest for (12 - x) months
Three months after the joining of B, C joined the two with an investment of Rs. 55,000.
C invest for (12 - x - 3)⇒ (9 - x)
Profit share = A : B : C
Profit share = 65,000 × 12 : 50,000 × (12 - x) : 55,000 × (9 - x)
⇒ 156 : 10(12 - x) : 11(9 - x)
A got 50% of profit as his share
⇒ 156/(156 + 120 - 10x + 99 - 11x) = 1/2
⇒ 312 = 375 - 21x
⇒ 21x = 63
⇒ x = 3 month
or
156 = 10(12 - x) : 11(9 - x)
156 = 219-21x
21x = 63
x = 3
∴ A alone finance the business for 3 month.

Simple & Compound Interest

1. A sum of money was lent at simple interest at 11% per annum for 7/2 years and 9/2 years, respectively. If the interest difference for two periods was Rs. 5500, find the sum.

(A) 40000
(B) 50000
(C) 60000
(D) 45000
(E) Question not attempted

Answer:- (B)

Explanation:-

Let P be the sum of money lent.
Given,
Rate of interest per annum (R) = 11%
Interest earned in 9/2 years – Interest earned in 7/2 years = Rs. 5500
Using simple interest formula, we have;
P × (9/2) × 11 × (1/100) – P × (7/2) × 11 × (1/100) = Rs. 5500
(P/200) [99 – 77] = Rs. 5500
22P/200 = Rs. 5500
P = (Rs. 5500 × 200)/22
= Rs. 50000
Therefore, the required sum is Rs. 50000

2. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs.1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is?

(A) Rs.121
(B) Rs.120
(C) Rs.123
(D) Rs.122
(E) Question not attempted

Answer:- (A)

Explanation:-

Given : rate of interest 5%
principal = 1600
first case: time=1 year
for half yearly compound interest
time=2*t=2*1=2
rate of interest=R/2=5/2
A=P(1 + R/100)n
A=1600[1+5/200]2
A=1600*41/20*41/40=1681
CI=A-P = 1681-1600=81
second case : time =½
for half yearly compound interest
time=2*t=2*½=1
rate of interest=R/2=5/2
A=P(1 + R/100)n
A=1680[1+5/200]
A=1680*41/40
A=1640
CI=A-P = 1640-1600=40
from first and second case
total gain=81+40=121

3. Mihir’s capital is 5/4 times more than Tulsi’s capital. Tulsi invested her capital at 50 % per annum for 3 years (compounded annually). At what rate % p.a. simple interest should Mihir invest his capital so that after 3 years, they both have the same amount of capital?

(A) 20/3 %
(B) 10 %
(C) 50/3 %
(D) 1.728 %
(E) None of these

Answer:- (C)

Explanation:-

Given
Mihir’s capital is 5/4 times more than Tulsi’s capital.
suppose Tulsi’s capital=4x
Mihir’s capital=5/4*4x+4x=9x
In Tulsi’s case
A=P(1 + R/100)n
A=4x[1+50/100]3=4x*3/2*3/2*3/2 —----------1
In Mihir’s case
A=P+SI=9x+9x*R*3 —----------2
from 1 and 2 cases
4x*27/8=9x*[1+3R]
3/2=1+3R
3R=1/2
R=1/6
R%=100/6=50/3

4. A sum of Rs. 800 amounts to Rs. 920 in 3 years at simple interest. If the interest rate increases by 3%, what will be the amount?

(A) 828

Perimeter & Area Of Plane Figures

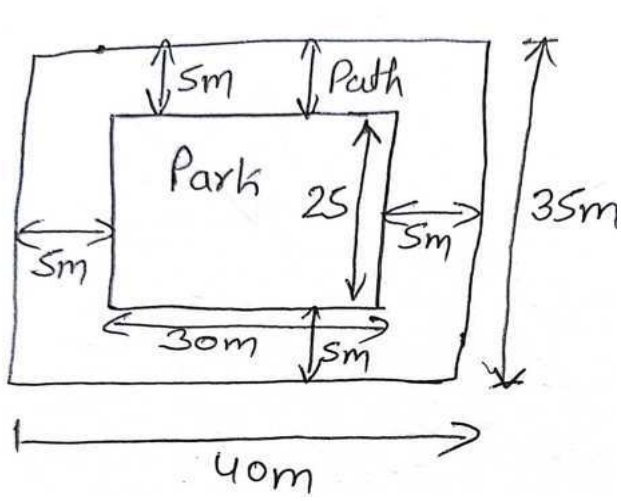
1. A rectangular park of length 30 m and breadth 25 m has a path of uniform width 5 m around its perimeter. Find the cost of tiling the whole path if the cost of tiling per 10 m2 is ₹ 1500.

(A) 97500
(B) 97000
(C) 96500
(D) 98500
(E) Question not attempted

Ans (A)

Explanation:

Length of the park = 30 m
Breadth of the park = 25 m
A rectangle is a two-dimensional shape with four sides, four right angles, and opposite sides that are parallel and equal in length.
The formula for the area of a rectangle is A = L ∗ W where A is the area, L is the length, and W is the width of the rectangle.
The formula for the perimeter of a rectangle is
P = 2 (L + W) where P is the perimeter, L is the length and W is the width.



Area of park = 30 × 25 = 750 m2
Area of the park and path = 40 × 35 = 1400 m2
Required area of the path = Area of the park and path – area of the park
= 1400 – 750 = 650 m2.
Cost of tiling per 10 m2 = ₹ 1500
Cost of tiling 1 m2 = ₹ 150
Cost of tiling 650 m2 = 650 × 150 = ₹ 97,500.
∴ The cost of tiling the path is ₹ 97,500.

2. The perimeter of a square of side 25 cm is equal to the perimeter of a rectangle whose width is 2/5th the side of the square. Find the area of the rectangle.

(A) 400 cm²
(B) 500 cm²
(C) 450 cm²
(D) 600 cm²
(E) Question not attempted

Ans (A)

Explanation:

Side of square = 25 cm
Perimeter of square = 4 × 25 = 100 cm
Width of the rectangle = 2/5 of 25 cm = 2/5 × 25 = 10 cm
Let x be the length of the rectangle. Given that the perimeter of the square is equal to the perimeter of the rectangle.
∴ Perimeter of rectangle = 2 × (x + 10) = 100 cm
⇒ x = 100/2 – 10 = 40 cm
Area of the rectangle = 40 × 10 = 400 cm2

3. Consider the isosceles trapezoid PQRS. The bases are |BC| = 102 m, |AD| = 62 m and the arm s = 29 m. Find the height of the trapezoid and the area of the trapezoid.

(A) 21m and 1722 m²
(B) 20m and 1722 m²
(C) 22m and 1700 m²
(D) 21m and 1700 m²
(E) Question not attempted

Ans (A)

Explanation:

A trapezium is a two-dimensional quadrilateral with one pair of sides that are parallel.

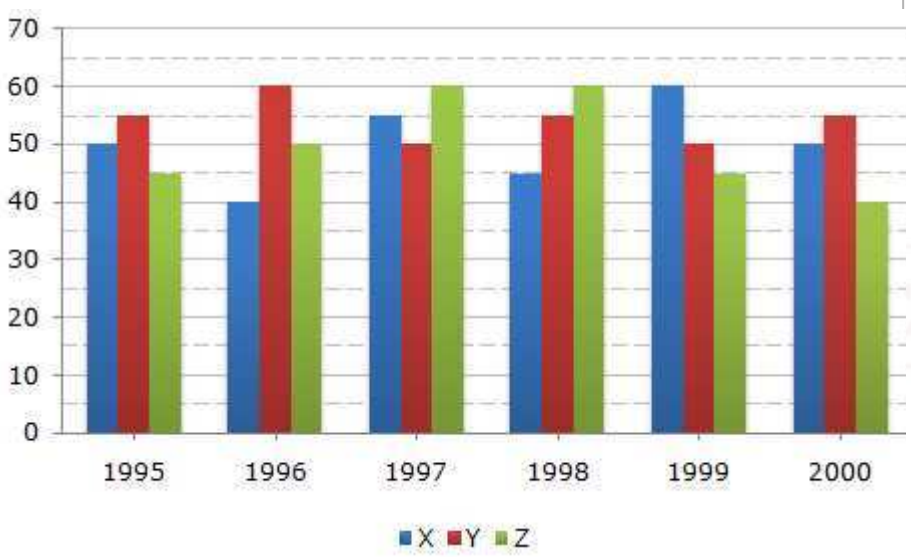
- The parallel sides of a trapezium are called 'bases'
- while the non-parallel sides are known as the 'legs' of the trapezium.
- The adjacent interior angles sum up to 180°.
- The sum of all the interior angles in a trapezium is always 360°.
- Area of trapezium = 1/2 × Sum of parallel sides × height.
- Perimeter of trapezium = Sum of all 4 sides

An isosceles trapezoid is a convex quadrilateral with two parallel sides and other two sides of equal length
Let height = x = AE

Data Analysis (Tables, Bar diagram, Line graph, Pie-chart

1. A soft drink company prepares drinks of three different flavours - X, Y and Z. The production of three flavours over a period of six years has been expressed in the bar graph provided below.

Production of Three Different Flavours X, Y and Z by a Company over the years (in lakh bottles)



For which flavour was the average annual production maximum in the given period?

(A) X only
(B) Y only
(C) Z only
(D) X and Y
(E) Question not attempted

Ans (B)

Explanation:

Average annual productions over the given period for various flavours are:

For Flavour X = [1/6 x (50 + 40 + 55 + 45 + 60 + 50)] = 50 lakh bottles.

For Flavour Y = [1/6 x (55 + 60 + 50 + 55 + 50 + 55)] = 54.17 lakh bottles.

For Flavour Z = [1/6 x (45 + 50 + 60 + 60 + 45 + 40)]= 50 lakh bottles.

Therefore Maximum average production is for Flavour Y.

2. The following table gives the percentage distribution of population of five states, P, Q, R, S and T on the basis of poverty line and also on the basis of sex.

State	Percentage of Population below the Poverty Line	Proportion of Males and Females	
		Below Poverty Line	Above Poverty Line
		M : F	M : F
P	35	5 : 6	6 : 7
Q	25	3 : 5	4 : 5
R	24	1 : 2	2 : 3
S	19	3 : 2	4 : 3
T	15	5 : 3	3 : 2

If the population of males below poverty line for State Q is 2.4 million and that for State T is 6 million, then the total populations of States Q and T are in the ratio?

(A) 1:3
(B) 2:5
(C) 3:7
(D) 4:9
(E) Question not attempted

Ans (B)

Explanation:

For State Q:

Male population below poverty line = 2.4 million.

Let the female population below poverty line be *x* million.

Then 3:5 = 2.4 : x

3x = 2.4*5 = 12

x = 4

Total population below poverty line = (2.4 + 4) = 6.4 million.

If Nq be the total population of State Q, then,

25% of Nq = 6.4million

Nq = 6.4 x 100 / 25 = 25.6 million

For State T:

Male population below poverty line = 6 million.

Let the female population below poverty line be *y* million.

Then, 5:3 = 6 : y

y = 18/5 = 3.6

Total population below poverty line = (6 + 3.6) = 9.6 million.

If Nt be the total population of State T, then,

15% of Nt = 9.6 million

Nt = 9.6 x 100/15 = 64 million

Mean(Arithmetic, Geometric and Harmonic), Median and Mode

1. Find the median of the following data

Classes		0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency		5	10	18	30	20	12	5

(A) 35.67
(B) 35
(C) 36.67
(D) 36
(E) Question not attempted

Ans (A)

Explanation:

For finding the median we create a table by adding the columns to given data. One column is for cumulative frequency which means sum of frequencies up to that class interval.

Then we find the median class for which class interval(N/2)th frequency lies. Then median is given by

median=L+[(N/2-f0)/f]h

L is a lower interval of the median class

N is the sum of all frequencies

f0 is the cumulative frequency of preceding median class

f is the frequency of the median class

h is the height of class interval

Class interval	Frequency (fi)	Cumulative frequency
0-10	5	5
10-20	10	15
20-30	18	33 = f0
30-40	30 = f	63
40-50	20	83
50-60	12	95
60-70	5	100

We know that

N=∑fi=100.

Now, we need to find in which class (N/2)th frequency lies.

We know that N/2=50.

So, frequency 50 lies in the class of 30.

So, the median class is 30-40.

We know that the formula of median is

median=L+[(N/2-f0)/f]h

By substituting these values in the formula we get

h is height of class interval $(h = 10)$

By substituting these values in the formula we

$$\Rightarrow \text{median} = 30 + \left(\frac{\frac{100}{2} - 33}{30} \right) \times 10$$

$$\Rightarrow \text{median} = 30 + \frac{17}{3}$$

$$\Rightarrow \text{median} = 35.67$$

Therefore, the median of given data is 35.67

2. Find the mean of the following data

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	5	10	18	30	20	12	5

(A) 35
(B) 36.6
(C) 37.5
(D) 35.6
(E) Question not attempted

Ans (D)

Explanation:

For finding the mean we create a table by adding the columns to given data. One column is for midpoint of class, xi and other column for product of frequency and midpoint of class fixi

then we find mean using the formula

Mean =∑fixi/∑fi

Class interval	Frequency (fi)	Midpoint of class (xi)	fixi
0-10	5	5	25
10-20	10	15	150
20-30	18	25	450
30-40	30	35	1050
40-50	20	45	900
50-60	12	55	660
60-70	5	65	325

By substituting the required values in the formula we get

Probability

1. A man and his wife appear in an interview for two vacancies in the same post. The probability of husband's selection is (1/7) and the probability of wife's selection is (1/5). What is the probability that Only one of them is selected ?

(A) 2/7
(B) 1/7
(C) 3/4
(D) 4/5
(E) Question not attempted

Ans (A)

Explanation:

Let A = Event that the husband is selected
An = Event that the husband is not selected
B = Event that the wife is selected
Bn = Event that the wife is not selected
Then, P(A) = 1/7 and P(B) = 1/5
P(An) = 1-1/7 = 6/7 and P(Bn) = 1-1/5 = 4/5
Reruired probability = P[(A and not B) or (B and not A)]
= P[(A and An) or (B and Bn)]
= P[(A and An) + (B and Bn)]
= P(A)*P(An) + P(B)*P(Bn)
= (1/7 x 4/5) + (1/5 x 6/7) = 10/35 = 2/7

2. One card is drawn from a deck of 52 cards, well-shuffled. Calculate the probability that the card will

(i) be an ace,
(ii) not be an ace.

(A) 2/13 and 11/13
(B) 1/13 and 11/13
(C) 2/13 and 12/13
(D) 1/13 and 12/13
(E) Question not attempted

Ans (D)

Explanation:

Well-shuffling ensures equally likely outcomes.
(i) There are 4 aces in a deck.
Let E be the event the card drawn is ace.
The number of favourable outcomes to the event E = 4
The number of possible outcomes S = 52
Therefore, P(E) = n(E)/n(S) = 4/52 = 1/13
(ii) Let F is the event of 'card is not an ace'
The number of favourable outcomes to F = 52 – 4 = 48
The number of possible outcomes S = 52
Therefore, P(F) = n(F)/n(S) 48/52 = 12/13

3. A coin is tossed three times, find the probability of following events.

P: 'No head appears',
Q: 'Exactly one head appears' and
R: 'At Least two heads appear'.

(A) 1/2, 3/8, 5/8
(B) 1/8, 1/8, 5/8
(C) 1/8, 3/8, 1/2
(D) 1/2, 1/8, 1/2
(E) Question not attempted

Ans (C)

Explanation:

The sample space of the experiment is:
Total possible outcomes 'S' = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}
n(S) = 8
Total possible outcomes in case of 'P' = {TTT},
Total possible outcomes in case of 'Q' = {HTT, THT, TTH},
Total possible outcomes in case of 'R' = {HHT, HTH, THH, HHH}
n(P) = 1, p(P) = n(P)/n(S) = 1/8
n(Q) = 3, p(Q) = n(Q)/n(S) = 3/8
n(R) = 4, p(R) = n(R)/n(S) = 4/8 = 1/2

4. Find the probability of getting a numbered card when a card is drawn from the pack of 52 cards.

(A) 2/13
(B) 9/13
(C) 5/13
(D) 7/13
(E) Question not attempted

Ans (B)

Explanation:

Total Cards = 52.
Let S be the sample space.
n(S) = 52
Numbered Cards = (2, 3, 4, 5, 6, 7, 8, 9, 10) = 9
9 from each suit,
So total no of numbered cards = 4 × 9 = 36
Let E = Event of getting a numbered card
n(E) = 36