upGrad

Quantitative Aptitude and Logical Reasoning

Preparatory Content

Memorize

upGrad

Squares of numbers from 1 to 20

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$

$11^2 = 121$
$12^2 = 144$
$13^2 = 169$
$14^2 = 196$
$15^2 = 225$
$16^2 = 256$
$17^2 = 289$
$18^2 = 324$
$19^2 = 361$
$20^2 = 400$

Memorize

upGrad

Cubes of numbers from 1 to 15

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$
$6^3 = 216$
$7^3 = 343$
$8^3 = 512$
$9^3 = 729$
$10^3 = 1000$

$11^3 = 1331$
$12^3 = 1728$
$13^3 = 2197$
$14^3 = 2744$
$15^3 = 3375$

Memorize

upGrad

Fraction equivalents of percentages

1 = 100%	1/11 = 9.09%
1/2 = 50%	1/12 = 8.3%
1/3 = 33.3%	1/13 = 7.69%
1/4 = 25%	1/14 = 7.14%
1/5 = 20%	1/15 = 6.66%
1/6 = 16.6%	1/16 = 6.25%
1/7 = 14.28%	1/17 = 5.88%
1/8 = 12.5%	1/18 = 5.55%
1/9 = 11.11%	1/19 = 5.26%
1/10 = 10%	1/20 = 5%

Memorize

upGrad

Basic algebraic formulae of squares and cubes

$(a + b)^2 = a^2 + 2ab + b^2$

$(a - b)^2 = a^2 - 2ab + b^2$

$a^2 - b^2 = (a + b)(a - b)$

$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$

$(a - b)^3 = a^3 - b^3 - 3ab(a - b)$

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

If $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$

Examples

upGrad

Example: 16.6% of 300 = ?

Example: $a + 1/a = 10$, Find the value of $a^3 + 1/a^3$

Examples

upGrad

Example: 16.6% of 300 = ?

16.6% = 1/6

Hence, 16.6% of 300 = 1/6 of 300

= (1/6)*300 = 50

Example: a + 1/a = 10, Find the value of $a^3 + 1/a^3$

$(a + 1/a)^3 = a^3 + 1/a^3 + 3a*1/a(a + 1/a)$

$\Rightarrow 10^3 = a^3 + 1/a^3 + 3(10)$

$\Rightarrow a^3 + 1/a^3 = 1000 - 30 = 970$

Examples

upGrad

1. 12.5% greater than 240 =

2. Decrease 40 by 37.5%

Examples

upGrad

1. 12.5% greater than 240 =

   12.5% = 1/8

   240+⅛*240 = 240+30 = 270

   Or 240+⅛*240 = 9/8*240 = 270

2. Decrease 40 by 37.5%

   37.5 = 12.5*3

   ∴ 37.5% = 3/8

   Decrease 40 by 3/8 = 40*(1-⅜) = 40*(⅝) = 25

Ratios

upGrad

Ratio of Apples to Oranges = 3:5. There are 30 more Oranges than Apples.

Find the no. of Apples and the no. of Oranges.

Ratios

upGrad

Ratio of Apples to Oranges = 3:5. There are 30 more Oranges than Apples.

Assume the no. of apples = 3x (multiple of 3), No. of Oranges = 5x (multiple of 5)

Difference is 5x-3x = 2x

$\Rightarrow 2x = 30 \Rightarrow x = 15$

Apples = 3*15 = 45

Oranges = 5*15 = 75

Ratios

upGrad

Divide 30000 among 3 persons in the ratio 1:2:3

Ratios

upGrad

Divide 30000 among 3 persons in the ratio 1:2:3

Total number of parts 1+2+3 = 6 parts (or assume x, 2x, 3x)

⇒ each part = 30000/6 = 5000

First person: 1 part of 6 parts (1/6 of total) = 5000 (value of x)

Second person: 2 parts (2/6 of total) = 10000 (value of 2x)

Third person: 3 parts (3/6 of total) = 15000 (value of 3x)

Ratios

upGrad

Combining ratios

a:b = 3:2 b:c = 5:4

Then a:b:c = ?

Ratios

upGrad

Combining ratios

a:b = 3:2 b:c = 5:4

Then a:b:c = ?

b is the connecting term, bring b to a common value

LCM of 2 and 5 = 10

a:b = 3:2 = 15:10 b:c = 5:4 = 10:8

Therefore, a:b:c = 15:10:8

Proportion

upGrad

Useful properties

$$\frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d} = \frac{a-c}{b-d}$$

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d}$$

Proportion

upGrad

Direct Proportion	Inverse Proportion
x proportional to y ⇒ x = ky	x inv. proportional to y ⇒ x = k*1/y
or x/y = k (ratio constant)	or xy = k (product constant)
If x*2 ⇒ y*2 (if x becomes twice, y will also become twice)	x*2 ⇒ y*½ (if x becomes twice, y will become half)
If x*1/3 ⇒ y*1/3	x*1/3 ⇒ y*3
x and y change by same factor	x and y change by inverse factor
Examples:	Examples:
Speed & Distance Time and Distance People and Work	Speed & Time People and Time

Examples

upGrad

If 10 men can finish a task in 20 days, 25 men will finish the task in

_____

Examples

upGrad

If 10 men can finish a task in 20 days, 25 men will finish the task in

_____

More people will take less time

i.e. People and time are in inverse proportion

No. of people becomes 25/10 = 5/2 times

∴ Time required should become 2/5 times

i.e. (2/5)*20 = 8 days

Examples

upGrad

If 10 men can finish a task in 20 days, 25 men will finish the task in

_____

More people will take less time

i.e. People and time are in inverse proportion

Alternatively, inverse proportion means xy = k

i.e. product of people and time must be constant

⇒ 10*20 = 25*t ⇒ t = 8 days

Examples

upGrad

Three persons Mukesh, Anil and Amit were asked to do a job. Mukesh did 1/2 of the work and left. Then Anil came, did 1/3 of the remaining work and left. Finally Amit came, did 1/5 of the remaining work and left. What fraction of the work is still remaining?

Examples

upGrad

Three persons Mukesh, Anil and Amit were asked to do a job. Mukesh did 1/2 of the work and left. Then Anil came, did 1/3 of the remaining work and left. Finally Amit came, did 1/5 of the remaining work and left. What fraction of the work is still remaining?

AVOID FRACTIONS!

Let the work be 2*3*5 = 30 units (product or LCM of denominators)

Mukesh did 1/2 of 30 = 15 Remaining work = 15

Anil did 1/3 of 15 = 5 Remaining work = 15 - 5 = 10

Amit did 1/5 of 10 = 2 Remaining work = 10 - 2 = 8 Fraction = 8/30 = 4/15

Percentage

upGrad

If x>y, which is greater, x% of y or y% of x?

Percentage

upGrad

If x>y, which is greater, x% of y or y% of x?

x% of y = (x/100)*y = xy/100

y% of x = (y/100)*x = xy/100

x% of y = y% of x

36% of 75 may be difficult to find

But 36% of 75 = 75% of 36 which is easier to find

We know 75% = 3/4

Thus, 75% of 36 = (3/4)*36 = 27

Percentage

upGrad

Revenue of a company

2021	2022	2023
100 cr	120 cr	100 cr

By what % is the revenue greater in 2022 than 2021?

By what % is the revenue lesser in 2023 than 2022?

Percentage

upGrad

Revenue of a company

2021	2022	2023
100 cr	120 cr	100 cr

By what % is the revenue greater in 2022 than 2021?

Change is 20 from 100 (100 becomes the initial value)

% Change = (20/100)*100 = (1/5)*100 = 20%

By what % is the revenue lesser in 2023 than 2022?

Change is still 20 but from 120 (120 becomes the initial value)

% Change = (20/120)*100 = (1/6)*100 = 16.6%

Percentage

upGrad

Increase by 20% not same as decrease by 20% (initial values different)

$$\%\ change = \frac{change\ in\ value}{initial\ value} \times 100$$

Examples

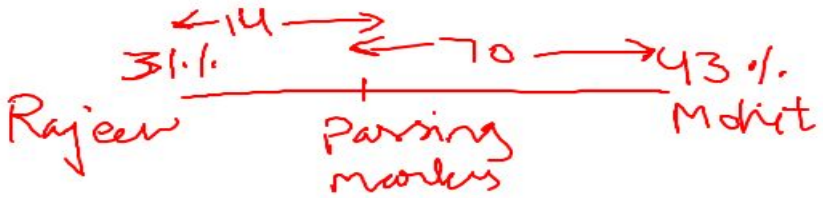
upGrad

In an examination, Rajeev secured 31% marks and failed by 14 marks. Mohit scored 43% and got 70 marks more than the passing marks. What was the pass percentage?

Examples

upGrad

In an examination, Rajeev secured 31% marks and failed by 14 marks. Mohit scored 43% and got 70 marks more than the passing marks. What was the pass percentage?



As shown above, difference between Rajeev and Mohit's scores is 12% which is equal to 84 marks.

12% = 84 therefore 1% = 7

Therefore, 31% = 217 marks. Passing marks would be 217+14 = 231

Passing percentage = 31% + 2%(14 marks) = 33% (since 1% = 7, 14 marks will be 2%)

Successive Percentage Change

upGrad

10% discount followed by 20% disc = 20% discount followed by 10% disc

Both cases result in same effective discount

⇒ Order of % change doesn't matter in case of multiple % changes

In general,

x% change followed by y% change = y% change followed by x% change

Effective % change = (x + y + xy/100) %

Change can be increase or decrease

% increase = positive, % decrease = negative

Successive Percentage Change

upGrad

Price of pizza increases by 10% and a week later, decreases by 10%. Will there be any change from the initial price? If yes, how much?

Successive Percentage Change

upGrad

Price of pizza increases by 10% and a week later, decreases by 10%. Will there be any change from the initial price? If yes, how much?

10% increase then 10% decrease will definitely result in a change in price

The values on which these changes are made are different

Successive Percentage Change

upGrad

Price of pizza increases by 10% and a week later, decreases by 10%. Will there be any change from the initial price? If yes, how much?

Assuming initial price = 100

Price after 10% increase = 110

Now 10% decrease will be on 110 (10% of 110 = 11)

Final price = 110 - 11 = 99

Change from 100 to 99 = 1% decrease

Successive Percentage Change

upGrad

Price of pizza increases by 10% and a week later, decreases by 10%. Will there be any change from the initial price? If yes, how much?

Another approach

Effective % change = (x + y + xy/100) %

x = 10%, y = -10%

Effective % change = 10 - 10 + 10*(-10)/100

= -1%

Negative value indicates decrease

Examples

upGrad

Price of pizza increases by 25%. By what % should the consumption be reduced to keep the expense on pizza unchanged?

Examples

upGrad

Price of pizza increases by 25%. By what % should the consumption be reduced to keep the expense on pizza unchanged?

Expense = Price*Quantity consumed

Any % change in price or quantity will also be the % change in expense.

Effective % change should be 0 because final price is unchanged

Assuming reduction in quantity = y%

Net % change = $(x + y + xy/100) = 0$

$\Rightarrow 25 - y - 25y/100 = 0 \Rightarrow 5y/4 = 25$

$\Rightarrow$ y = 20% decrease

Examples

upGrad

Price of pizza increases by 25%. By what % should the consumption be reduced to keep the expense on pizza unchanged?

Another approach

Expense = Price*Quantity consumed

Any % change in price or quantity will also be the % change in expense.

Assume initial expense = 100

After price increase, expense = 125

To keep it unchanged, 125 should be reduced to 100

Change is 25 from 125 = 25/125 = 1/5 = 20%

25% increase and 20% decrease result in no effective change.

Examples

upGrad

At the end of 2014, Ram bought 10 dozen cows. Thereafter, he added x% of the cows at the beginning of the year and sold y% of the cows at the end of the year where $x>0$ and $y>0$. If Ram had 10 dozen cows at the end of 2018 after completing the sales for that year, which of the following is true?

1. $x=y$
2. $x<y$
3. $x>y$
4. $x=y/2$

Examples

upGrad

At the end of 2014, Ram bought 10 dozen cows. Thereafter, he added x% of the cows at the beginning of the year and sold y% of the cows at the end of the year where x>0 and y>0. If Ram had 10 dozen cows at the end of 2018 after completing the sales for that year, which of the following is true?

1. x=y 2. x<y 3. x>y 4. x=y/2

x% increase and y% decrease result in no change

Let x = 10% of 10 dozen = 1, Now, Ram has 11 dozen cows

y% is of 11 dozen

Since he had 10 dozen cows at the end, i.e. decrease must be 1 from 11 or 1/11 = 9.09%

$\therefore y < x$ or $x > y$

Profit & Loss

upGrad

CP = Cost Price, SP = Selling Price

Useful formulae

CP + Profit = SP or Profit = SP - CP

CP - Loss = SP or Loss = CP - SP

Profit % = (Profit/CP)*100

Loss % = (Loss/CP)*100

Profit% and Loss% are always on the basis of CP, not on SP

Marked price = display price (similar to mrp)

No discount means MP = SP

In case of discount, price after discount = SP

Examples

upGrad

A vendor sells 20 eggs and makes a profit equal to the selling price of 4 eggs. What percent profit does he make?

1. 20%
2. 25%
3. 10%
4. 15%

Examples

upGrad

A vendor sells 20 eggs and makes a profit equal to the selling price of 4 eggs. What percent profit does he make?

1. 20% 2. 25% 3. 10% 4. 15%

Assume SP of an egg = 1,

SP of 20 eggs = 20, Profit = SP of 4 eggs = 4

CP = SP - Profit ⇒ CP = 16

∴ Profit % = (4/16)*100 = 25%

Simple & Compound Interest

upGrad

Simple Interest	Compound Interest
• Principal does not change • Fixed interest in each period	• Interest added to Principal • Principal and interest keep changing for each period
P=1000, Rate=10% Year 1: Interest = 100 Year 2: Interest = 100 Year 3: Interest = 100	P=1000, Rate=10% Year 1: Interest = 100 (P = 1100) Year 2: Interest = 110 (P = 1210) Year 3: Interest = 121 (P = 1331)
SI = P*R*T/100 Final amount = P + I	$A = P[1+R/100]^n$ n is number of compounding periods CI = A - P

Simple & Compound Interest

upGrad

Using $A = P[1+R/100]^n$ in different compounding cases

Let R = 12% per annum, time = 2 years

Annual compounding: Interest calculated once every year

In the formula: R = 12, n = 2

Half-yearly compounding: Interest calculated every six months

In the formula: Rate = R/2 = 12/2 = 6%, n = 2*2 = 4 compounding periods

Examples

upGrad

A sum of money invested at compound interest gets doubled in 5 years.

In how many years will it amount to eight times of itself?

Examples

upGrad

A sum of money invested at compound interest gets doubled in 5 years.

In how many years will it amount to eight times of itself?

Assume P = 100

It becomes 200 in 5 years after which 200 becomes the principal. In next 5 years, 200 will become 400. In further 5 years, 400 will become 800.

Hence, 100 becomes 800 in 15 years.

Alternatively, the principal gets multiplied by 2 in every 5 years.

To become 8 times, it should become 2*2*2 times i.e. 3 periods of 5 years = 15 years.

Averages

upGrad

The average marks of a class were 65. Due to some errors, marks of 80 students had to be changed from 90 to 70 each and the average fell to 49 marks. Find the total number of students.

A. 300 B. 100 C. 500 D. 200

Averages

upGrad

The average marks of a class were 65. Due to some errors, marks of 80 students had to be changed from 90 to 70 each and the average fell to 49 marks. Find the total number of students.

A. 300 B. 100 C. 500 D. 200

Average = Total/no. of values

Let number of students be ‘n’

⇒ Total marks of class = 65n

Decrease of 20 for 80 students ⇒ total decrease of 1600

New average = 49 ⇒ new total = 49n

65n - 1600 = 49n ⇒ 16n = 1600 ⇒ n = 100

Averages - effect of change in data

upGrad

Numbers	Arithmetic Mean (Average)
a b c d e	M
a±k b±k c±k d±k e±k	M ± k
a*k b*k c*k d*k e*k	M*k
a/k b/k c/k d/k e/k	M/k

If the numbers are 1, 2, 2, 3

Mean (Average) = 2

If all numbers increase by 5 ⇒ 6, 7, 7, 8

Mean will also increase by 5 i.e new mean = 7 (2+5)

Examples

upGrad

In January, the average temperature for first 16 days was 10℃. The average temperature for last 16 days was 15℃. What was the average temperature for the whole month?

1. 12℃
2. 13.3℃
3. 12.6℃
4. None of these

Examples

upGrad

In January, the average temperature for first 16 days was 10℃. The average temperature for last 16 days was 15℃. What was the average temperature for the whole month?

1. 12℃ 2. 13.3℃ 3. 12.6℃ 4. None of these

Total of first 16 days (dates 1 to 16) = 16*10 = 160

Total of last 16 days (dates 16 to 31) = 16*15 = 240

Adding the two,

Total of 1 to 16 + Total of 16 to 31 (16th counted twice)

i.e. Total of 1 to 31 + 16th

⇒ Can't be determined

Rules of Counting

upGrad

N factorial = N! = product of all natural numbers from 1 to N.

4! = 1x2x3x4 = 24 = 4x3x2x1

= 4x3! = 4x3x2!

N! = Nx(N-1)x(N-2).....x2x1

= Nx(N-1)! = Nx(N-1)x(N-2)!

Value of 6!/4! = 6x5x4! / 4! = 6x5 = 30

Value of 0! = 1 (By definition)

Rules of Counting

upGrad

a) **Multiplication Rule / AND rule**

If there are 3 cinema halls to watch a movie and 5 restaurants to go for dinner after the movie, total number of different ways of watching the movie and having dinner afterwards will become 3x5 = 15

C1	C2	C3
R1 R2 R3 R4 R5	R1 R2 R3 R4 R5	R1 R2 R3 R4 R5

If a certain activity A can be done in 'm' different ways and another activity B can be done in 'n' different ways, then the total number of ways of doing **both A and B** will be **m × n**.

In other words, whenever the word 'and' connects doing a number of activities, we multiply the number of ways of doing each activity.

Rules of Counting

upGrad

b) **Addition Rule / OR rule**

If, out of the two activities, we are doing any one of them; which means either we do A or we do B, but not both. Then, the number of ways of doing either A or B will be obtained by addition.

C1, C2, C3 or R1, R2, R3, R4, R5

In the previous example, if we can go **either to the movie or for dinner**, the number of different ways to catch the movie or having dinner will be 3 + 5 = 8

In other words, whenever the word 'or' connects doing a number of activities, we add the number of ways of doing each activity.

Rules of Counting

upGrad

A person answers 4 questions in a test, each question has 4 options. How many different sequences of answers are possible?

Rules of Counting

upGrad

A person answers 4 questions in a test, each question has 4 options. How many different sequences of answers are possible?

Since the person answers all 4 questions,

It will mean Q1 and Q2 and Q3 and Q4

4 x 4 x 4 x 4

256 different ways

Rules of Counting

upGrad

How many three digit numbers can be formed using digits 0,1,2,3,4,5 such that

a) repetition of digits allowed

_ _ _

b) repetition of digits not allowed

_ _ _

Rules of Counting

upGrad

How many three digit numbers can be formed using digits 0,1,2,3,4,5 such that

a) repetition of digits allowed

$$5 * 6 * 6 = 180$$

_ _ _

(prefer to fill the places from left to right unless there is any condition attached to any place)

b) repetition of digits not allowed

_ _ _

Rules of Counting

upGrad

How many three digit numbers can be formed using digits 0,1,2,3,4,5 such that

a) repetition of digits allowed

$$5 * 6 * 6 = 180$$

_ _ _

(prefer to fill the places from left to right unless there is any condition attached to any place)

b) repetition of digits not allowed

$$5 * 5 * 4 = 100$$

_ _ _

(be careful about the placement of 0, it cannot be used in the first place)

Rules of Counting

upGrad

Arrangements:

The number of ways of arranging n distinct objects in a row/line is given by n! (n factorial)

n(n-1)*(n-2)*.....*2*1*

Combinations (Selections)

The number of ways of selecting *r* objects from *n* distinct objects is called combinations of *n* things by taking *r* things at a time. It is written as ${}^{n}C_{r}$.

$$ {}^{n}C_{r} = \frac{n!}{r!\,(n-r)!} $$

Examples

upGrad

In how many ways can a team of 3 members be formed out of a group of 5 persons?

A B C

B C A

C A B

Order of persons does not matter

Select 3 out of 5

$^5C_3 = \frac{5!}{3! \cdot 2!} = \frac{5 \cdot 4 \cdot 3!}{3! \cdot 2} = 10$

Examples

upGrad

How many 8 letter words can be formed using the letters of the word EQUATION?

How many 5 letter words can be formed using the letters of the word EQUATION?

Examples

upGrad

How many 8 letter words can be formed using the letters of the word EQUATION?

Different words, hence the order of letters is important

8 distinct objects - arrange in a line - 8! ways

How many 5 letter words can be formed using the letters of the word EQUATION??

Select 5 letters out of 8 letters and then arrange to form different words

${}^{8}C_{5}$ * 5! ways

Probability

upGrad

Chance of occurrence of an event

$0 \leq p \leq 1$

Sample space: Set of all possible outcomes (Total outcomes of an action)

Event: Any subset of the sample space

Probability of an event A, P(A) = $\frac{Favourable}{Total}$

Tip: Always think about total cases first, then think of favourable

Complimentary event A' = non-occurrance of A

P(A') = 1 - P(A)

Probability

upGrad

Dice

1 die rolled : 6 total cases

2 dice rolled: 36 total cases

3 dice rolled: 216 total cases

1 die rolled

- P(of getting 5) =
- P(of getting 1 or 2) =
- P(prime number occurs) =

Probability

upGrad

Dice

1 die rolled : 6 total cases

2 dice rolled: 36 total cases

3 dice rolled: 216 total cases

1 die rolled

- P(of getting 5) = ⅙ (1 favorable case, 6 total cases)
- P(of getting 1 or 2) = ⅙ + ⅙ = 2/6 or ⅓ (2 favorable cases, 6 total cases)
- P(prime number occurs) = 3/6 (2,3,5 favorable)

Probability

upGrad

2 dice rolled

Find probability that the sum of numbers is less than or equal to 5

Probability

upGrad

2 dice rolled

Find probability that the sum of numbers is less than or equal to 5

Dice 1	Dice 2
1	1, 2, 3, 4
2	1, 2, 3
3	1, 2
4	1
5	
6	

Total 36 cases

Favorable 10 cases

P(sum ≤ 5) = 10/36 = 5/18

2 cards are drawn from a pack of playing cards. Find probability of getting both cards as spades.

a) 1/16 b) 1/17 c) 1/20 d) none

2 cards are drawn from a pack of playing cards. Find probability of getting both cards as spades.

a) 1/16 b) 1/17 c) 1/20 d) none

Total cases: select 2 cards out of 52 cards

This can be done in ${}^{52}C_2$ ways

Favorable cases: Select both cards of spades

This can be done in ${}^{13}C_2$ ways

Required probability = $P = \frac{{}^{13}C_2}{{}^{52}C_2} = \frac{13*12}{52*51} = \frac{3}{51} = \frac{1}{17}$

Coins

Nothing mentioned => fair coin => P(H) = P(T) = 1/2

4 Coins are tossed. Find probability of getting exactly 2 heads.

upGrad

Coins

Nothing mentioned => fair coin => P(H) = P(T) = 1/2

4 Coins are tossed. Find probability of getting exactly 2 heads.

Total cases 2*2*2*2 = 16 (since H or T can come on each toss)

For favorable cases, in 4 positions we need 2H 2T

Hence, favorable cases will be ${}^4C_2$ or 4!/2!*2! = 6

Probability = 6/16 = 3/8

Examples

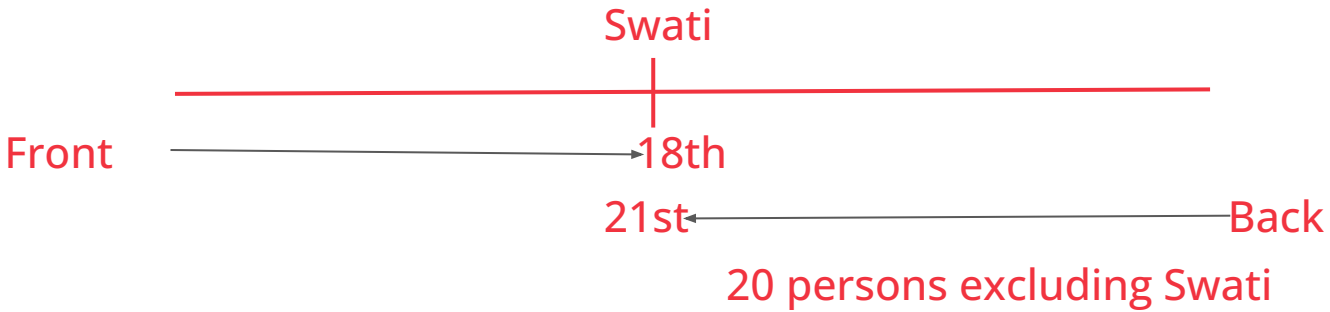
upGrad

Swati is the 18th person from the front end of a queue and 21st person from the back end of the queue. How many people are in the queue?

Examples

upGrad

Swati is the 18th person from the front end of a queue and 21st person from the back end of the queue. How many people are in the queue?



From the front end, Swati is the 18th and there are 20 more persons after Swati till the back end. Hence, total number of persons in the queue
= 18+20 = 38

Examples

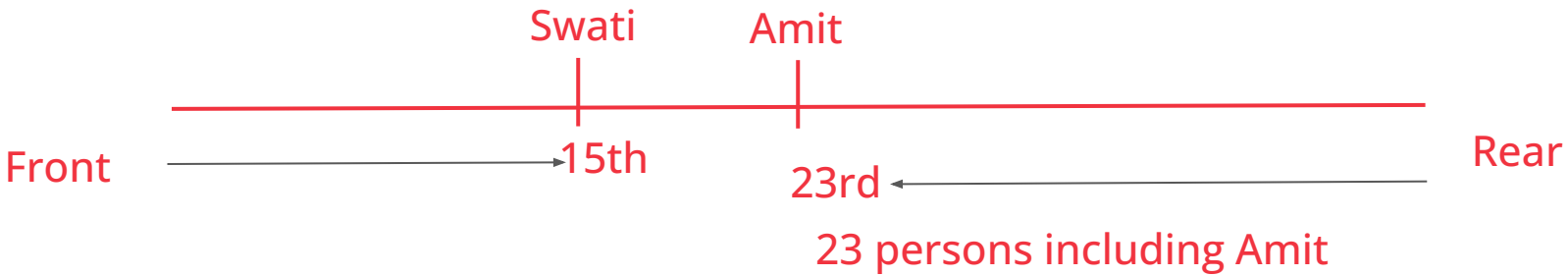
upGrad

Swati is the 15th person from the front end of a queue and Amit is the 23rd person from the rear end of the queue. Five persons are standing between them. How many people are in the queue?

Examples

upGrad

Swati is the 15th person from the front end of a queue and Amit is the 23rd person from the rear end of the queue. Five persons are standing between them. How many people are in the queue?



From the front end, Swati is the 15th, 5 are between Swati and Amit and 23 persons counting from Amit till the rear end.
Hence, total number of persons in the queue
= 15+5+23 = 43

Examples

upGrad

Three bells ring at an interval of 18 min, 24 min and 32 min respectively. They begin to ring together at 3 pm. What length of time will elapse before they ring together again?

Examples

upGrad

Three bells ring at an interval of 18 min, 24 min and 32 min respectively. They begin to ring together at 3 pm. What length of time will elapse before they ring together again?

1st bell will ring after every 18 minutes (18,36,54...) i.e multiples of 18

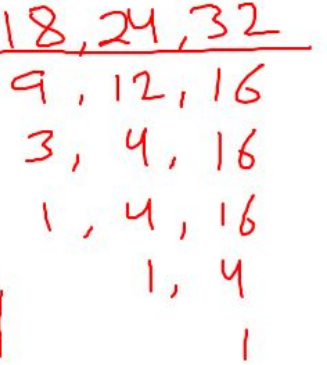
2nd bell will ring after every 24 minutes (24,48,72...) i.e multiples of 24

Similarly, 3rd bell will ring after multiples of 32.

All bells will ring together at a common multiple of 18,24,32

The LCM(least common multiple) of 18,24,32 will give us the answer.

LCM = 2x3x3x4x4 = 288 minutes.



Examples

upGrad

A is now 9 years older than B. In 10 years, A will be twice as old as B was 10 years ago. Find the present age of B.

Examples

upGrad

A is now 9 years older than B. In 10 years, A will be twice as old as B was 10 years ago. Find the present age of B.

Let B's present age be b. Hence, A's present age would be b+9 (9 years older).

After 10 years, A's age will be b+9+10 = b+19.

10 years ago, B's age was b-10.

According to the question, b+19 = 2(b-10)

$\Rightarrow$b = 39 years.

Examples

upGrad

Dhoni purchased 10 bikes, all at the same price. He sold seven of these at a profit of 25% and the remaining three at a loss of 25%. If he made a net profit of Rs. 50000, then his purchase price of a bike, in Rupees, was

Examples

upGrad

Dhoni purchased 10 bikes, all at the same price. He sold seven of these at a profit of 25% and the remaining three at a loss of 25%. If he made a net profit of Rs. 50000, then his purchase price of a bike, in Rupees, was

All bikes had the same price, let's assume 100 each

profit = loss = 25% of 100 i.e 25 rupees

profit on 7 bikes = 7*25 = 175 loss on 3 bikes = 3*25 = 75

Net profit = 175 - 75 = 100

Compare

Net profit 100 when Price of 1 bike = 100 (Ratio 1:1)

Hence, for Net profit 50000 Price of 1 bike must be 50000

Time, Speed, Distance

upGrad

Distance = Speed x Time Or

Speed = Distance/Time or Time = Distance/Speed

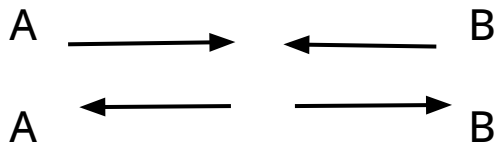
Convert from km/hr to m/s : multiply by 5/18

Convert from m/s to km/hr : multiply by 18/5

Average Speed = Total distance covered / Total time taken

If two objects move in opposite directions,

their relative speed = sum of individual speeds ($S_A + S_B$)



If two objects move in the same direction,

their relative speed = difference of individual speeds ($S_A - S_B$)

Examples

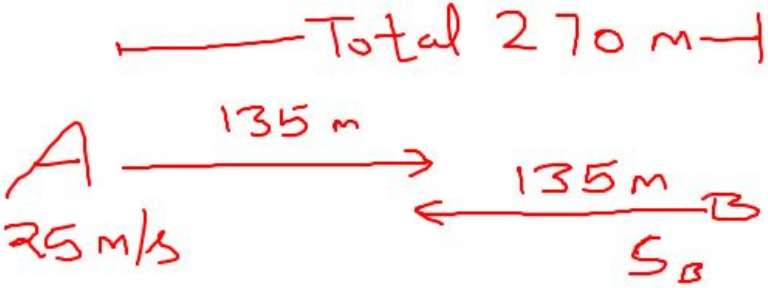
upGrad

Train A crosses train B in 6 seconds when traveling at 25 m/s and in the opposite direction of train B. Find the speed of train B if length of both trains is 135 m.

Examples

upGrad

Train A crosses train B in 6 seconds when traveling at 25 m/s and in the opposite direction of train B. Find the speed of train B if length of both trains is 135 m.



Traveling in opposite directions

Relative speed = $S_A + S_B = 25 + S_B$

Total distance travelled to cross train B = 270 m

Distance = Speed x Time

$270 = (25 + S_B)*6$ i.e $25 + S_B = 45$

$S_B = 20$ m/s

Clocks and Calendars

upGrad

Clocks

Angle between two consecutive numbers = 360/12 = 30°

Therefore, when the minute hand moves 5 minutes, it covers 30°

When the minute hand moves 1 minute, it covers 6°

Speed of the minute hand = 6° per minute

The hour hand goes from 12 to 1 in one hour i.e 30° in 60 minutes

Speed of the hour hand = 0.5° per minute

Clocks and Calendars

upGrad

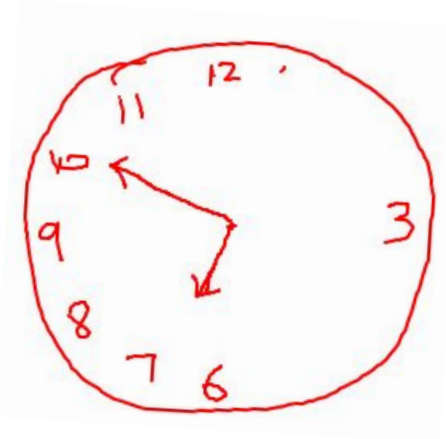
Example: What is the smaller angle between the hour hand and the minute hand at 6:50?

When the hour hand is at 6 and the minute hand is at 10, the angle between them would be 30*4 = 120°

But, since it's 6:50, hour hand would be between 6 and 7.

In 60 minutes, hour hand moves 30

In 50 minutes, it would have moved 25



Therefore, the smaller angle between the two hands

= 120 - 25 = 95

Clocks and Calendars

upGrad

Calendars

1 regular year = 365 days

365 = 7*52 + 1 i.e 1 regular year has 52 weeks and 1 additional day

1 leap year = 366 days

366 = 7*52 + 2 i.e 1 leap year has 52 weeks and 2 additional days

Months with 31 days have 4 weeks + 3 days

Months with 30 days have 4 weeks + 2 days

Clocks and Calendars

upGrad

Example: If today is Monday, what day will it be after 61 days?

61/7 gives quotient 8 and remainder 5 (61 = 8*7 + 5)

That means 61 days = 8 complete weeks + 5 days

So it will be Monday + 5 days = Saturday