



MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

COMBINATIONS

Example

1. Evaluate ${}^{11}C_4$.



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2. If ${}^n P_r = 720$ and ${}^n C_r = 120$ then find the value of r .

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3. Evaluate the following: ${}^{100}C_{98}$

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4. (i) If ${}^n C_{18} = {}^n C_{12}$ then find the value of ${}^{32} C_n$.

(ii) If ${}^{10} C_r = {}^{10} C_{r+4}$ then find the value of ${}^5 C_r$.

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Solved Examples

1. Evaluate:

(i). ${}^{10}C_3$ (ii). ${}^{11}C_8$

(iii). ${}^{50}C_{48}$ (iv). ${}^{63}C_{63}$



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2. If ${}^n C_8 = {}^n C_6$, find ${}^n C_3$.



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3. If ${}^n C_{r-1} : {}^n C_r : {}^n C_{r+1} = 3 : 4 : 5$, find the values of n and r .



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4. If the ratio ${}^{2n}C_3 : {}^nC_3$ is equal to 11:1 find n .

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5. Property: Product of r consecutive number is divisible by $r!$

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6. If ${}^nP_r = {}^nP_{r+1}$ and ${}^nC_r = {}^nC_{r-1}$, find n and r .

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7. Prove that ${}^{2n}C_n = \frac{2^n \times [1 \cdot 3 \cdot 5 \dots (2n - 1)]}{n!}$.



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8. Prove that
$$\frac{(4n)C_{2n}}{(2n)C_n} = \frac{1.3.5\dots(4n-1)}{[1.3.5\dots(2n-1)]^2}$$



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9. If ${}^n C_8 : {}^{n-2} P_4 : 57 : 16$, find n .



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Practical Problems On Combinations Solved Examples

1. In how many ways can a cricket eleven be chosen out of a batch of 15 players, if

(i) there is no restriction on the selection ?

(ii) a particular player is always chosen?

(iii) a particular player is never chosen?

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2. The number of ways can a committee of 5 members be selected from 6 men and 5 ladies consisting of 3 men and 2 ladies is

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3. Out of 5 men and 2 women, a committee of 3 is to be formed. In how many ways can it be formed if at least one woman is to be included?



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4. A committee of 5 is to be formed out of 6 men and 4 ladies. In how many ways can this be done, when

(a) at least 2 ladies are included,

(b) at most 2 ladies are included?



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5. In an examination, a question paper consists of 12 questions divided into two parts i.e., part I and part II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3

from each part. In how many ways can a student select the questions?

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6. For the post of 5 teachers, there are 23 applicants, 2 posts are reserved for SC candidates and there are 7 SC candidates among the applicants. In how many ways can the selection be made?

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7. How many diagonals are there in a polygon of n sides?

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8. There are 10 points in a plane, no three of which are in the same straight line, except 4 points, which are collinear.

Find (i) the number of lines obtained from the pairs of these points,

(ii) the number of triangles that can be formed with vertices as these points.



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9. A box contains 6 red and 5 white balls. In how many ways can 6 balls be selected so that there are at least two balls of each colours?



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10. How many committee of five person with a chairperson can be selected from 12 persons ?

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11. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box, if atleast one black ball is to be included in the draw is

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12. There are 4 girls and 7 boys in a group. In how many ways a team of 5 members can be selected if

(i) there is no girl in the team?

(ii) there are at least 3 girls in the team?

(iii) there are at least one boy and at least one girl in the team?

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13. A bag contains six white marbles and five red marbles. Find the number of ways in which four marbles can be drawn from the bag. If (i) they can be of any colour. (ii) two must be white and two red. (iii) they must all be of the same colour.

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14. We wish to select 6 persons from 8, but if the person A is chosen, then B must be chosen. In how many ways can the selections be made? 15 (b) 22 (c) 7 (d) None of these

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15. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (i) four cards are of the same suit, (ii) four cards belong to four different suits, (iii) are face cards, (iv) two are red cards and two are bla

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16. From a class of 25 students, 10 are to be chosen for an excursion party. There are 3 students who decide that either all of them will join or none of them will join. In how many ways can the excursion party be chosen?

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17. A boy has 3 library tickets and 8 books of his interest in the library. Of these 8 he does not want to borrow mathematics part II, unless mathematics part I is also borrowed. If number of ways can be choose the three books to be borrowed is λ , then number of perfect squares less than λ .

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18. A polygon has 44 diagonals. The number of its sides are

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19. If m parallel lines in a plane are intersected by a family of n parallel lines, the number of parallelograms that can

be formed is a. $\frac{1}{4}mn(m-1)(n-1)$ b. $\frac{1}{4}mn(m-1)(n-1)$ c. $\frac{1}{4}m^2n^2$ d. none of these

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20. In an examination a candidate has to pass each of the 5 subjects. The number of ways can be fail is

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21. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

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22. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers?

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23. A committee of 12 is to be formed from nine women and eight men. In how many ways can this be done if at least five women have to be included in a committee? In how many of these committees a. the women hold majority? b. the men hold majority?

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24. In a village, there are 87 families of which 52 families have at most 2 children. In a rural development programme, 20 families are to be helped chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made?

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25. In how many ways can 19 identical books on English and 17 identical books on Hindi be placed in a row on a shelf so that two books on Hindi may not be together ?

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Mixed Problems On Permutations And Combinations Solved Examples

1. Out of 7 consonants and 4 vowels. how many words of 3 consonant and 2 vowels can be formed?

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2. The English alphabet has 5 vowels and 21 consonants. How many words with 2 different vowels and 2 different consonants can be formed from the alphabet?

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3. How many words, with or without meaning, each of 2 vowels and 3 consonants can be formed from the letters of the word DAUGHTER?

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4. How many words, with or without meaning, can be formed using all the letters of the word EQUATION at a

time so that the vowels and consonants occur together?

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5. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?

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Exercise 9 A

1. Evaluate:

(i) ${}^{20}C_4$ (ii) ${}^{16}C_{13}$ (iii) $(90C_{88})$

(iv) ${}^{71}C_{71}$ (v) ${}^{n+1}C_n$ (vi) $\sum_{r=1}^6 {}^6C_r$

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2. Verify that:

$$(i) {}^{15}C_8 + {}^{15}C_9 - {}^{15}C_7 = 0 \quad (ii) {}^{10}C_4 + {}^{10}C_3 = {}^{11}C_4$$

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3. (i) ${}^n C_7 = {}^n C_5$, find n . (ii) If ${}^n C_{14} = {}^n C_{16}$, find ${}^n C_{28}$.

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4. (i) If ${}^{20}C_r = {}^{20}C_{r+6}$, find r .

(ii) If ${}^{18}C_r = {}^{18}C_{r+2}$, find ${}^r C_5$.

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5. If ${}^n C_{r-1} = {}^n C_{3r}$, find r.

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6. If ${}^{2n} C_3 : {}^n C_3 = 12:1$, find n.

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7. If ${}^{15} C_r : {}^{15} C_{R-1} = 11:5$, then find the value of 'r'.

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8. If ${}^n P_r = 840$ and ${}^n C_r = 35$, then r is equal to

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9. If ${}^n C_{r-1} = 36$, ${}^n C_r = 84$ and ${}^n C_{r+1} = 126$, find n and r.

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10. If

${}^{n+1} C_{r+1} : {}^n C_r = 11 : 6$ and ${}^n C_r : {}^{n-1} C_{r-1} = 6 : 3$,

find n and r.

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11. In how many ways 11 players can be selected from 15 cricket players ?

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12. If there are 12 persons in a party, and if each two of them shake hands with each other, how many handshakes happen in the party?

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13. How many chords can be drawn through 21 points on a circle?

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14. From a class of 25 students, 4 are to be chosen for a competition. In how many ways can this be done?

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Exercise 9 B

1. The no. of ways can 5 sportsmen be selected from a group of 10 sportsmen is

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2. A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.

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3. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.

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4. How many different boat parties of 8 consisting of 5 boys and 3 girls can be made from 20 boys and 10 girls?

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5. In how many ways can a student choose a programme of 5 courses if 9 courses are available and 2 specific courses are compulsory for every student?

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6. A sports team of 11 students is to be constituted, choosing at least 5 from class XI and at least 5 from class XII. If there are 20 students in each of these classes, in how many ways can the team be constituted. What is the importance of sports in one's life ?

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7. From 4 officers and 8 clerks, in how many ways can 6 be chosen (i) to include exactly one officer, (ii) to include at least one officer?

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8. A cricket team of 11 players is to be selected from 16 players including 5 bowlers and 2 wicketkeepers. In how many ways can a team be selected so as to consist of exactly 3 bowlers and 1 wicketkeeper?

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9. In how many ways can a cricket team be selected from a group of 25 players containing 10 batsmen, 8 bowlers, 5 all-rounders and 2 wicketkeepers, assuming that the team of 11 players requires 5 batsmen, 3 all-rounders, 2 bowlers and 1 wicketkeeper?



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10. A question paper has two parts, Part A and party B each containing 10 questions. If a student has to chose 8 from Part A and 5 from Part B, in how many ways can he choose the questions?



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11. In an examination a student has to answer 4 questions out of 5 questions; questions 1 and 2 are however compulsory. Determine the number of ways in which the student can make the choice.

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12. A student has to answer 10 questions, choosing at least 4 from each of part A and B. If there are 6 questions in part A and 7 in part B. In how many ways can the student choose 10 questions?

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13. A candidate is required to answer 7 questions out of 12 questions which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 from either group. In how many different ways can he choose the seven questions?

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14. Out of 6 teachers and 8 students, a committee of 11 is to be formed. In how many ways can this be done, if the committee contains

(i) exactly 4 teachers? (ii) at least 4 teachers?

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15. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of: (i) exactly 3 girls ? (ii) atleast 3 girls ? (iii) atmost 3 girls ?

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16. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

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17. A committee of 5 is to be formed out of 6 men and 4 ladies. In how many ways can this be done, when

(a) at least 2 ladies are included,

(b) at most 2 ladies are included?



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18. From a class of 14 boys and 10 girls, 10 students are to be chosen for a competition, at least including 4 boys and 4 girls. The 2 girls who won the prizes last year should be included. In how many ways can the selection be made?



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19. Determine the number of 5 card combinations out of a deck of 52 cards if at least one of the 5 cards has to be as king?

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20. Find the number of diagonals of
(i) a hexagon, (ii) a decagon, (iii) a polygon of 18 sides.

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21. How many triangles can be obtained by joining 12 points, four of which are collinear?

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22. How many triangles can be formed in a decagon ?

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23. How many different selections of 4 books can be made from 10 different books, if There is no restriction Tow particular books are always selected; Two particular books are never selected?

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24. How many different products can be obtained by multiplying two or more of the numbers 3, 5,7, 11 (without

repetition)?



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25. There are 10 professors and 20 students out of whom a committee of 2 professors and 3 students is to be formed. Find the number of ways in which this can be done. Further find in how many of these committees: A particular professor is included A particular student is included Particular student is excluded



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26. There are 18 points in a plane of which 5 are collinear. How many straight lines can be formed by joining them?



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Exercise 9 C

1. Out of 12 consonants and 5 vowels, how many words, each containing 3 consonants and 2 vowels, can be formed?



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2. How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?



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3. The English alphabet has 5 vowels and 21 consonants. How many words with 2 different vowels and 2 different consonants can be formed from the alphabet?

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4. In how many ways can 4 girls and 3 boys be seated in a row so that no two boys are together?

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5. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no

letter is repeated, if

(i) 4 letters are used at a time?

(ii) all letters are used at a time?

(iii) all letters are used but first letter is a vowel?

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Exercise 9 D

1. If ${}^{20}C_r = {}^{20}C_{r-10}$ then find the value of ${}^{17}C_r$.

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2. If ${}^{20}C_{r+1} = {}^{20}C_{r-1}$ then find the value of ${}^{10}C_r$.

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3. If ${}^n C_{12} = {}^n C_8$ then find the value of ${}^{22} C_n$.

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4. If ${}^{35} C_{n+7} = {}^{35} C_{4n-2}$ then find the value of n .

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5. Find the values of (i) ${}^{200} C_{198}$, (ii) ${}^{76} C_0$, (iii) ${}^{15} C_{15}$.

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6. If ${}^m C_1 = {}^n C_2$ prove that $m = \frac{1}{2}n(n - 1)$.

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7. ${}^5 C_1 + {}^5 C_2 + {}^5 C_3 + {}^5 C_4 + {}^5 C_5$ is equal to 30 b. 31 c.
32 d. 33

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8. If ${}^{n+1} C_3 = 2({}^n C_2)$, find the value of n.

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9. If ${}^n P_r = 720$ and ${}^n C_r = 120$ then find the value of r.

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10. If ${}^{(n^2-n)}C_2 = {}^{(n^2-n)}C_4$ then find the value of n .

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11. Write the total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants.

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12. Write the number of diagonals of an n -sided polygon.

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13. Three persons enter a railway compartment. If there are 5 seats vacant in how many ways can they take these seats? 60 b. 20 c. 15 d. 125

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14. There are 12 points in a plane, out of which 3 points are collinear. How many straight lines can be drawn by joining any two of them?

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15. In how many ways can a committee of 5 be made out of 6 men and 4 women, containing at least 2 women?

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16. There are 13 cricket players, out of which 4 are bowlers. In how many ways can a team of 11 be selected from them so as to include at least 3 bowlers?

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17. How many different committees of 5 can be formed from 6 men and 4 women on which exact 3 men and 2 women serve? 6 b. 20 c. 60 d. 120

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18. The number of parallelograms that can be formed from a set of four parallel lines intersecting another set of three parallel lines is:



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