MATHS

BOOKS - NCERT EXEMPLAR

DIRECT AND INVERSE PROPORTIONS

Solved Examples

1. If x and y are directly proportional and when x = 13, y = 39, which of the following is not a

possible pair of corresponding values of x and y ?

A. 1 and 3

B. 17 and 51

C. 30 and 10

D. 6 and 18

Answer: C

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2. A car covers a distance in 40 minutes with an average speed of 60 km per hour. The average speed to cover the same distance in 30 minutes is

    A. 80 km//h

    B. $\dfrac{45}{2}/h$

    C. 70km//h

    D. 45km//h

Answer: A

3. Which of the following is in direct proportion?

A. One side of a cuboid and its volume.

B. Speed of a vehicle and the distance travelled in a fixed time interval

C. Change in weight and height among individuals

D. Number of pipes to fill a tank and the time required to fill the same tank.

Answer:

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4. Amrita takes 18 hours to travel 720 kilometres. Time taken by her to travel 360 kilometres is _____.

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5. If x and y are inversely proportional then

_____ = k where k is positive constant.

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6. Side of a rhombus and its perimeter are in

_____ proportion.

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7. When two quantities x and y are in inverse proportion, then $\dfrac{x}{y}$ is a constant.

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8. If the cost of 10 pencils is Rs 90, then the cost of 19 pencils is Rs 171??

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9. If 5 persons can finish a job in 10 days then one person will finish it in 2 days??

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10. In a scout camp, there is food provision for 300 cadets for 42 days. If 50 more persons join the camp, for how many days will the provision last?

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11. If two cardboard boxes occupy 500 cubic centimetres space, then how much space is required to keep 200 such boxes?

12. Under the condition that the temperature remains constant, the volume of gas is inversely proportional to its pressure. If the volume of gas is 630 cubic centimetres at a pressure of 360 mm of mercury, then what will

be the pressure of the gas if its volume is 720

cubic centimetres at the same temperature?

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1. Both u and v vary directly with each other.

When u is 10, v is 15, which of the following is

not a possible pair of corresponding values of

u and v?

A. 2 and 3

B. 8 and 12

C. 15 and 20

D. 25 and 37.5

Answer:

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2. Both x and y vary inversely with each other.

When x is 10, y is 6, which of the following is

not a possible pair of corresponding values of

x and y?

A. 12 and 5

B. 15 and 4

C. 25 and 2.4

D. 45 and 1.3

Answer:

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3. Assuming land to be uniformly fertile, the area of land and the yield on it vary

   A. directly with each other.

   B. inversely with each other.

   C. neither directly nor inversely with each other.

   D. sometimes directly and sometimes inversely with each other.

Answer:

4. The number of teeth and the age of a person vary

    A. directly with each other.

    B. inversely with each other

    C. neither directly nor inversely with each other.

    D. sometimes directly and sometimes inversely with each other.

Answer:

5. A truck needs 54 litres of diesel for covering a distance of 297 km. The diesel required by the truck to cover a distance of 550 km is

A. 100 litres

B. 50 litres

C. 25.16 litres

D. 25 litres

Answer: A

6. By travelling at a speed of 48 kilometres per hour, a car can finish a certain journey in 10 hours. To cover the same distance in 8 hours, the speed of the car should be

A. 60 km//h

B. 80 km//h

C. 30 km//h

D. 40 km//h

Answer:

7. In which of the following case, do the quantities vary directly with each other?

A.

B.

C.

D.

Answer:

8. Which quantities in the previous question vary inversely with each other?

(a)

x	0.5	2	8	32
y	2	8	32	128

(b)

p	1^2	2^2	3^2	4^2
q	1^3	2^3	3^3	4^3

(c)

r	2	5	10	25	50
s	25	10	5	2	0.5

(d)

u	2	4	6	9	12
v	18	9	6	4	3

A. x and y

B. p and q

C. r and s

D. u and v

Answer:

9. Which of the following vary inversely with

each other?

A. speed and distance covered.

B. distance covered and taxi fare.

C. distance travelled and time taken.

D. speed and time taken.

Answer:

10. Both x and y are in direct proportion, then $\dfrac{1}{x}$ and $\dfrac{1}{y}$ are

A. in indirect proportion

B. in inverse proportion.

C. neither in direct nor in inverse proportion.

D. sometimes in direct and sometimes in inverse proportion.

Answer:

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11. Meenakshee cycles to her school at an average speed of 12 km/h and takes 20 minutes to reach her school. If she wants to reach her school in 12 minutes, her average speed should be

A. $\dfrac{20}{3} Km/h$

B. $16 km/h$

C. 20km//h

D. 15km//h

Answer:

12. 100 persons had food provision for 24 days.

If 20 persons left the place, the provision will

last for

    A. 30 days

    B. $\dfrac{96}{5}$ days

    C. 120 days

    D. 120 days

Answer:

13. If two quantities x and y vary directly with each other, then

A. $\dfrac{x}{y}$ remains constant.

B. x – y remains constant.

C. x + y remains constant.

D. x + y remains constant.

Answer:

▶

14. If two quantities p and q vary inversely with each other, then

A. $\dfrac{p}{q}$ remains constant.

B. p + q remains constant.

C. p × q remains constant

D. p − q remains constant.

Answer:

15. If the distance travelled by a rickshaw in one hour is 10 km, then the distance travelled by the same rickshaw with the same speed in one minute is

A. $\dfrac{250}{9}$ m

B. $\dfrac{500}{9}$ m

C. 100m

D. $\dfrac{500}{3}$ m

Answer:

16. Both x and y vary directly with each other and when x is 10, y is 14, which of the following is not a possible pair of corresponding values of x and y?

A. 25 and 35

B. 35 and 25

C. 35 and 49

D. 15 and 21

Answer: B

17. If x = 5y, then x and y vary _____ with each

other

18. If xy = 10, then x and y vary _____ with each

other.

▶

19. When two quantities x and y are in _____ proportion or vary _____they are written as x = y

20. When two quantities x and y are in _____ proportion or vary _____they are written as $x = \dfrac{1}{y}$

21. Both x and y are said to vary _____ with each other if for some positive number k, xy = k.

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22. x and y are said to vary directly with each other if for some positive number k, _____ =k.

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23. Fill in the blanks in each of the following so as to make the statement true: Two quantities are said to vary. with each other if they increase (decrease) together in such a way that the ratio of the corresponding values remains same. $x \; and \; y$ are said to vary directly with each other if for some positive number k, $\qquad = k.$ If $u = 3 \, v$, then u and v vary . with each other.

24. Fill in the blanks in each of the following so as to make the statement true: Two quantities are said to vary. with each other if they increase (decrease) together in such a way that the ratio of the corresponding values remains same. $x \ and \ y$ are said to vary directly with each other if for some positive number $k,$ $= k.$ If $u = 3\,v,$ then u and v vary . with each other.

25. If 12 pumps can empty a reservoir in 20 hours, then time required by 45 such pumps to empty the same reservoir is _____ hours.

26. If x varies inversely as y, then

x	–	60
y	2	10

27. When the speed remains constant, the distance travelled is _____proportional to the time

28. On increasing a, b increases in such a manner that $\frac{a}{b}$ remains_____ and positive, then a and b are said to vary directly proportional with each other.

29. If on increasing a, b decreases in such a manner that _____ remains _____constant and positive, then a and b are said to vary inversely with each other.

30. If two quantities p and q vary inversely with each other then _____ of their corresponding values remains constant.

31. If two quantities p and q vary inversely with each other then _____ of their corresponding values remains constant.

32. The perimeter of a circle and its diameter vary _____ with each other.

33. A car is travelling 48 km in one hour. The distance travelled by the car in 12 minutes is _____.

34. An auto rickshaw takes 3 hours to cover a distance of 36 km. If its speed is increased by 4 km/h, the time taken by it to cover the same distance is _____.

35. If the thickness of a pile of 12 cardboard sheets is 45 mm, then the thickness of a pile of 240 sheets is _____ cm.

36. If x varies inversely as y and x = 4 when y = 6, then when x = 3 the value of y is _____.

A. 4

B. 8

C. 5

D. 6

Answer: B

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37. In direct proportion $\dfrac{a_1}{b_1} = \dfrac{a_2}{b_2}$

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38. In case of inverse proportion $a_2\_\_b_2$

39. If the area occupied by 15 postal stamps is $60\ cm^2$, then the area occupied by 120 such postal stamps will be _____.

40. If 45 persons can complete a work in 20 days, then the time taken by 75 persons will be _____ hours

41. Devangi travels 50 m distance in 75 steps, then the distance travelled in 375 steps is _____ km.

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42. Two quantities x and y are said to vary directly with each other if for some rational number k, xy = k.

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43. When the speed is kept fixed, time and distance vary inversely with each other

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44. When the distance is kept fixed, speed and time vary directly with each other.

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45. Length of a side of a square and its area vary directly with each other.

46. Length of a side of an equilateral triangle and its perimeter vary inversely with each other.

47. If d varies directly as t^2 then we can write $dt^2 = k$ where k is some constant.

48. If a tree 24 m high casts a shadow of 15 m, then the height of a pole that casts a shadow of 6 m under similar conditions is 9.6 m.

49. If x and y are in direct proportion, then (x – 1) and (y – 1) are also in direct proportion

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50. If x and y are in inverse proportion, then (x + 1) and (y + 1) are also in inverse proportion

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51. If p and q are in inverse variation then (p + 2) and (q − 2) are also in inverse proportion. (True/False)

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52. If one angle of a triangle is kept fixed then the measure of the remaining two angles vary inversely with each other

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53. Direct variations if two quantities a and b vary with each other in such a manner that the ratio $\dfrac{a}{b}$ remains constant and is positive then we say that a and b vary directly with each other or a and are in direct variation

54. Inverse variation if two quantities x and y vary with each other in such a manner that the product of remains constant and is positive then we say that a and b vary inversely as each

other or a varies inversely as b and b varies

inversely as a

55. If x varies inversely as y and when x = 6, y =

8, then for x = 8 the value of y is 10.

56. The number of workers and the time to

complete a job is a case of direct proportion.

57. For fixed time period and rate of interest, the simple interest is directly proportional to the principal

58. Which of the following are in inverse proportion? (i) The number of workers on a job and the time to complete the job. (ii) The

time taken for a journey and the distance travelled in a uniform speed. (iii) Area of cultivated land and the

59. In the following questions, which of them vary directly and which vary inversely with each other and which are neither of the two?

(i) The time taken by a train to cover a fixed distance and the speed of the train.

(ii) The distance travelled by CNG bus and the

amount of CNG used.

(iii) The number of people working and the time to complete a given work.

(iv) Income tax and the income

(v) Distance travelled by an auto-rickshaw and time taken

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60. In the following questions, which of them vary directly and which vary inversely with each other and which are neither of the two?

(i) Number of students in a hostel and consumption of food

(ii) Area of the walls of a room and the cost of white washing the walls.

(iii) The number of people working and the quantity of work.

(iv) Simple interest on a given sum and the rate of interest

(v) Compound interest on a given sum and the sum invested.

61. In the following questions, which of them vary directly and which vary inversely with each other and which are neither of the two?

(i) The quantity of rice and its cost.

(ii) The height of a tree and the number of years.

(iii) Increase in cost and number of shirts that can be purchased if the budget remains the same

(iv) Area of land and its cost

(v) Sales Tax and the amount of the bill

62. If x varies inversely as y and x = 20 when y = 600, find y when x = 400

63. The variable x varies directly as y and x = 80 when y is 160. What is y when x is 64?

64. l varies directly as m and l is equal to 5, when $m = \dfrac{2}{3}$ Find l when $m = \dfrac{16}{3}$

65. If x varies inversely as y and y = 60 when x = 1.5. Find x. when y = 4.5.

66. In a camp, there is enough flour for 300 persons for 42 days. How long will the flour last if 20 more persons join the camp?

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67. A contractor undertook a contract to complete a part of a stadium in 9 months with a team of 560 persons. Later on, it was required to complete the job in 5 months. How

many extra persons should he employ to complete the work?

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68. Sobi types 108 words in 6 minutes. How many words would she type in half an hour?

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69. A car covers a distance in 40 minutes with an average speed of 60 km/h. What should be

the average speed to cover the same distance

in 25 minutes

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70. It is given that l varies directly as m.

Write an equation which relates l and m.

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71. It is given that l varies directly as m.

Find the constant of proportion (k), when l is 6

then m is 18.

72. It is given that l varies directly as m.

Find l, when m is 33.

73. It is given that l varies directly as m.

Find m when l is 8.

74. If a deposit of Rs 2,000 earns an interest of Rs 500 in 3 years, how much interest would a deposit of Rs 36,000 earn in 3 years with the same rate of simple interest?

75. The mass of an aluminium rod varies directly with its length. If a 16 cm long rod has

a mass of 192 g, find the length of the rod whose mass is 105 g.

76. if 3, x, 6, 18 are in proportion , then x =

77. Find the value of x , if y = 2 x − 5 and y = 7 .

78. If Naresh walks 250 steps to cover a distance of 200 metres, find the distance travelled in 350 steps.

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79. A car travels a distance of 225 km in 25 litres of petrol. How many litres of petrol will be required to cover a distance of 540 kilometres by this car

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80. From the following table, determine if x and y are in direct proportion or not.

x	3	6	15	20	30
y	12	24	45	60	120

81. From the following table, determine if x and y are in direct proportion or not.

x	4	7	10	16
y	24	42	60	96

82. From the following table, determine if x and y are in direct proportion or not.

x	1	4	9	20
y	1.5	6	13.5	30

83. If a and b vary inversely to each other, then find the values of p, q, r .

a	6	8	q	25
b	18	p	39	r

84. If a and b vary inversely to each other, then

find the values of x, y, z.

a	2	y	6	10
b	x	12.5	15	z

85. If a and b vary inversely to each other, then find the values of l, m, n.

a	l	9	n	6
b	5	m	25	10

86. If 25 metres of cloth costs Rs 350, then What will be the cost of 40 metres of the same type of cloth?

87. If 25 metres of cloth costs Rs 337.50, then What will be the length of the cloth bought for Rs 810?

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88. A swimming pool can be filled in 4 hours by 8 pumps of the same type. How many such pumps are required if the pool is to be filled in $2\frac{2}{3}$ hours?

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89. The cost of 27 kg of iron is Rs 1,080, what will be the cost of 120 kg of iron of the same quality?

90. At a particular time, the length of the shadow of Qutub Minar whose height is 72 m is 80 m. What will be the height of an electric pole, the length of whose shadow at the same time is 1000 cm?
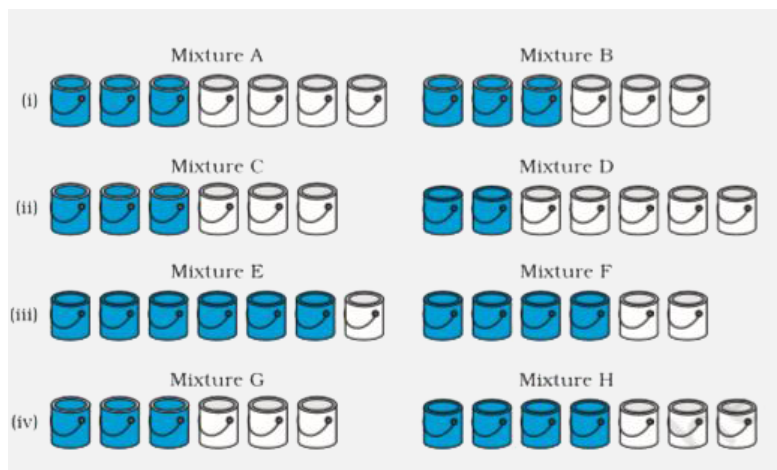
91. In a hostel of 50 girls, there are food provisions for 40 days. If 30 more girls join the hostel, how long will these provisions last?

92. Campus and Welfare Committee of school is planning to develop a blue shade for painting the entire school building. For this

purpose various shades are tried by mixing containers of blue paint and white paint. In each of the following mixtures, decide which is a lighter shade of blue and also find the lightest blue shade among all of them.


Mixture A

Mixture B

(i)

Mixture C

Mixture D

(ii)

Mixture E

Mixture F

(iii)

Mixture G

Mixture H

(iv)

If one container has one litre paint and the building requires 105 litres for painting, how

many container of each type is required to paint the building by darkest blue shade?

93. Work with a partner to write at least five ratio statements about this quilt, which has white, blue, and purple squares.
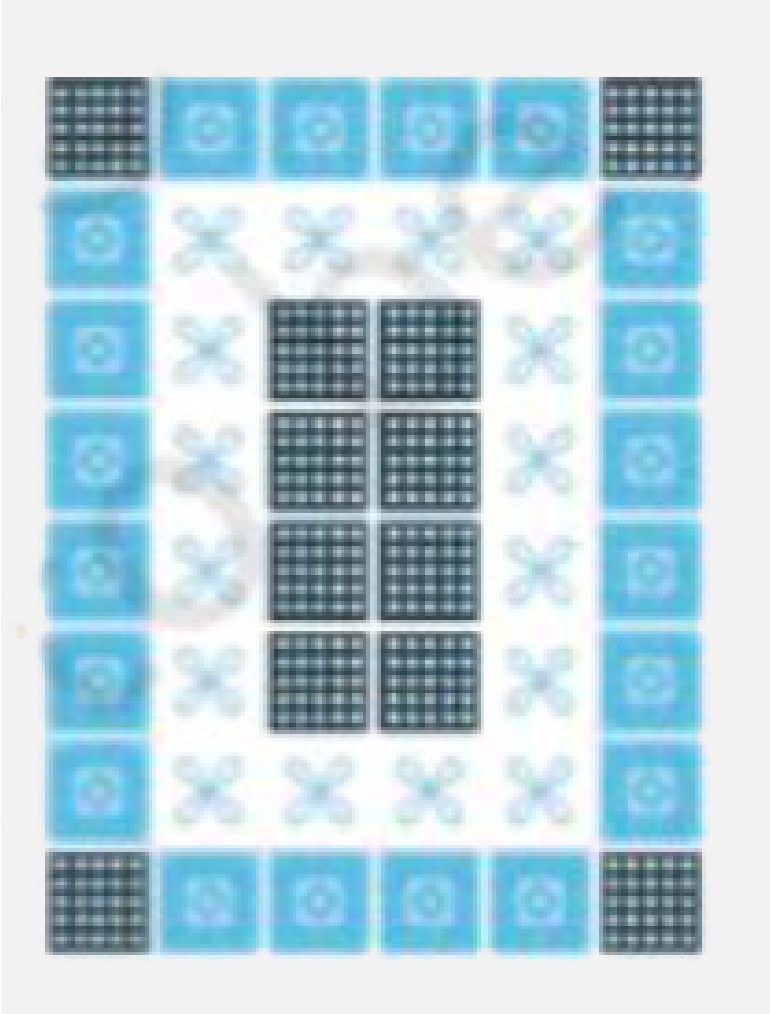
How many squares of each colour will be there

in 12 such quilts?

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94. A packet of sweets was distributed among 10 children and each of them received 4 sweets. If it is distributed among 8 children, how many sweets will each child get?

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95. 44 cows can graze a field in 9 days. How many less/more cows will graze the same field in 12 days?

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96. 30 persons can reap a field in 17 days. How many more persons should be engaged to reap the same field in 10 days?

97. Shabnam takes 20 minutes to reach her school if she goes at a speed of 6 km/h. If she wants to reach school in 24 minutes, what should be her speed?

98. Ravi starts for his school at 8:20 a.m. on his bicycle. If he travels at a speed of 10km/h, then he reaches his school late by 8 minutes but on travelling at 16 km/h he reaches the school 10 minutes early. At what time does the school start?

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99. Match each of the entries in Column I with the appropriate entry in Column II

Column I	Column II
1. x and y vary inversely to each other	A. $\dfrac{x}{y}$ = Constant
2. Mathematical representation of inverse variation of quantities p and q	B. y will increase in proportion
3. Mathematical representation of direct variation of quantities m and n	C. xy = Constant
4. When $x = 5$, $y = 2.5$ and when $y = 5$, $x = 10$	D. $p \propto \dfrac{1}{q}$
5. When $x = 10$, $y = 5$ and when $x = 20$, $y = 2.5$	E. y will decrease in proportion
6. x and y vary directly with each other	F. x and y are directly proportional
7. If x and y vary inversely then on decreasing x	G. $m \alpha n$
8. If x and y vary directly then on decreasing x	H. x and y vary inversely
	I. $p \alpha q$
	J. $m \alpha \dfrac{1}{n}$

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100. There are 20 grams of protein in 75 grams of sauted fish. How many grams of protein is

in 225 gm of that fish?

101. Ms. Anita has to drive from Jhareda to Ganwari. She measures a distance of 3.5 cm between these villages on the map. What is the actual distance between the villages if the map scale is 1 cm = 10 km?

102. A water tank casts a shadow 21 m long. A tree of height 9.5 m casts a shadow 8 m long at the same time. The lengths of the shadows are directly proprotional to their heights. Find the height of the tank.
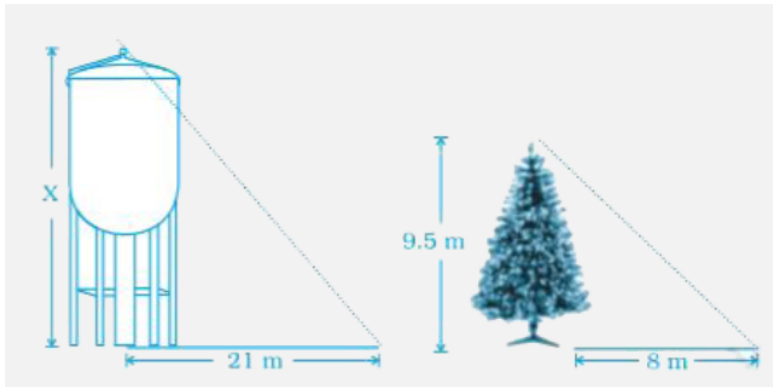
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103. The table shows the time four elevators take to travel various distances. Find which elevator is fastest and which is slowest.

	Distance (m)	Time (sec.)
Elevator-A	435	29
Elevator-B	448	28
Elevator-C	130	10
Elevator-D	85	5

How much distance will be travelled by elevators B and C seperately in 140 sec? Who travelled more and by how much?

104. A volleyball court is in a rectangular shape and its dimensions are directly proportional to the dimensions of the swimming pool given below. Find the width of the pool.
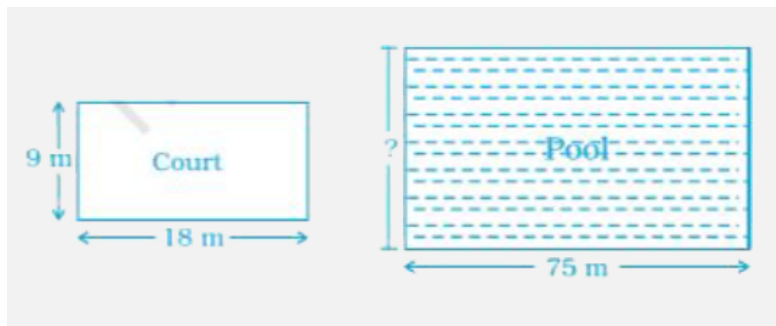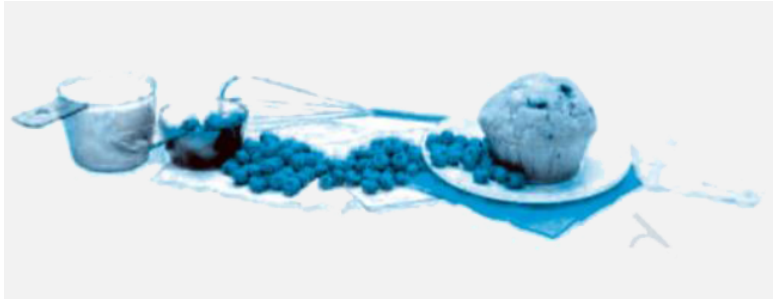
105. A recipe for a particular type of muffins requires 1 cup of milk and 1.5 cups of
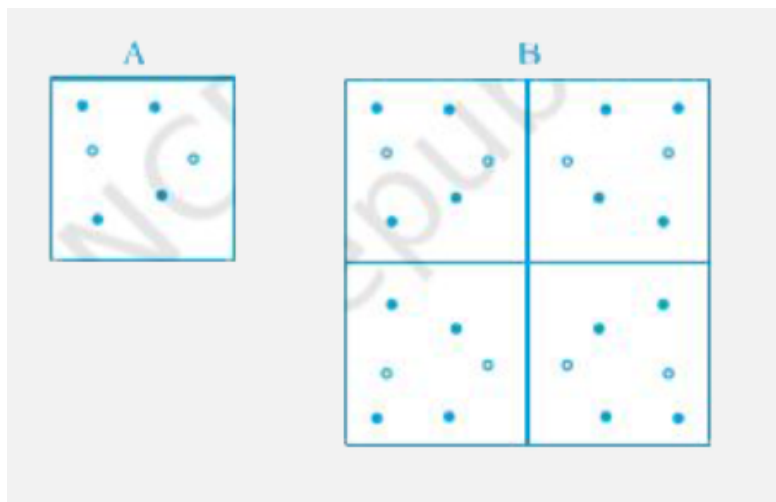
chocolates. Riya has 7.5 cups of chocolates. If she is using the recipe as a guide, how many cups of milk will she need to prepare muffins?

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106. Pattern B consists of four tiles like pattern A. Write a proportion involving red dots and blue dots in pattern A and B. Are they in direct

proportion? If yes, write the constant of proportion.

107. A bowler throws a cricket ball at a speed of 120 km/h. How long does this ball take to

travel a distance of 20 metres to reach the batsman?

108. The variable x is inversely proportional to y. If x increases by p%, then by what per cent will y decrease?

109. Here is a key board of a harmonium:

Find the ratio of white keys to black keys on the keyboard

110. Here is a key board of a harmonium:
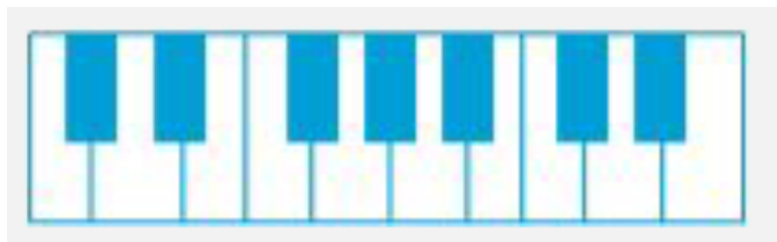
What is the ratio of black keys to all keys on

the given keyboard.
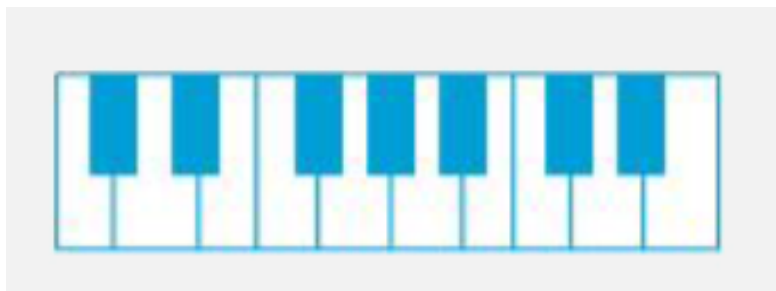
111. Here is a key board of a harmonium:

This pattern of keys is repeated on larger keyboard. How many black keys would you expect to find on a keyboard with 14 such

patterns.

112. The following table shows the distance travelled by one of the new eco-friendly energy-efficient cars travelled on gas.

Litres of gas	1	0.5	2	2.5	3	5
Distance (km)	15	7.5	30	37.5	45	75

Which type of properties are indicated by the

table? How much distance will be covered by the car in 8 litres of gas?

113. Kritika is following this recipe for bread. She realises her sister used most of sugar syrup for her breakfast. Kritika has only $\frac{1}{6}$ syrup, so she decides to make a small size of bread. How much of each ingredient shall she use? Bread recipe

1 cup quick cooking oats

$\frac{1}{3}$ cup sugar syrup

1 tablespoon cooking oil $1\frac{1}{3}$ cups water

3 tablespoons yeast

1 teaspoon salt.

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114. Many schools have a recommended students-teacher ratio as 35:1. Next year, school expects an increase in enrolment by 280 students. How many new teachers will

they have to appoint to maintain the students-teacher ratio?

115. Kusum always forgets how to convert miles to kilometres and back again. However she remembers that her car's speedometer shows both miles and kilometres. She knows that travelling 50 miles per hour is same as travelling 80 kilometres per hour. To cover a

distance of 200 km, how many miles Kusum would have to go?

116. The students of Anju's class sold posters to raise money. Anju wanted to create a ratio for finding the amount of money her class would make for different numbers of posters sold. She knew they could raise Rs 250 for every 60 posters sold.

How much money would Anju's class make for selling 102 posters?

117. The students of Anju's class sold posters to raise money. Anju wanted to create a ratio for finding the amount of money her class would make for different numbers of posters sold. She knew they could raise Rs 250 for every 60 posters sold.

Could Anju's class raise exactly Rs 2,000? If so,

how many posters would they need to sell? If not, why?

Think And Discuss

1. If 30 men can reap a field in 17 days, then 10 men reap the field in how many days?

2. In the questions of men and work we always use indirect variation. Now think of some situation related to men where direct variation will be used, e.g. If maximum 15 men can travel by three cars, then find maximum number of cars required for (a) 25 men (b) 38 men.

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